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Micro Processor based PWM Drivers **665**

Electronic Joysticks and Switches **672**

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Micro Processor based PWM Drivers

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	EC-PWM-A1-MPC1-P	666
	EC-PWM-A1-MPC1-D	668
	EC-PWM-A1-MPC1-E	670

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EC - PWM - A1 - MPC1 - P

Description

Micro-processor based PWM electronic driver for remote control of a single proportional solenoid valve.

Operation

The EC-PWM-MPC1 Proportional Valve driver supplies a solenoid with a *PWM (Pulse Width Modulated)* current proportional to the input signal from a potentiometer, PLC or other control systems

Adjustments of "Imin/Imax", "Ramp time", "Deadband" and "Dither" can be effected directly from a key-pad integrated on the front panel

Mounting option: panel-mounting style with INPUT/OUTPUT multi-core sheathed cable

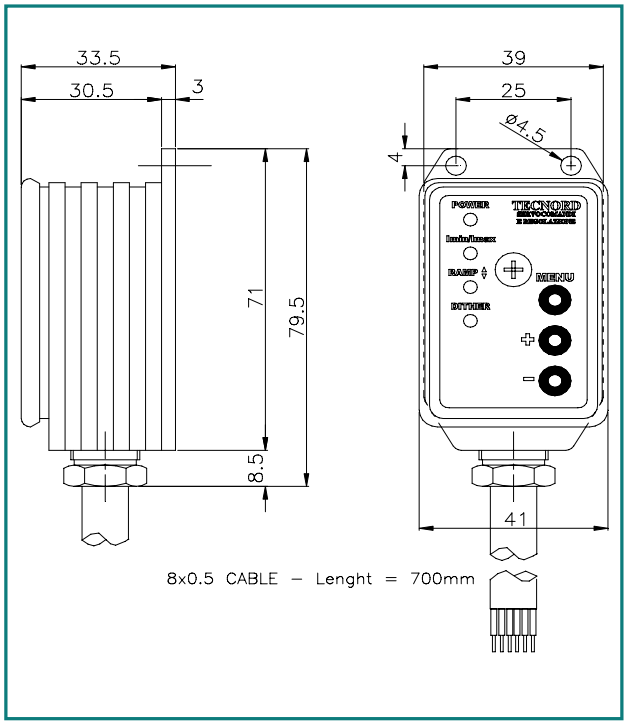
Features

- The current in the solenoid is independent of change in the coil resistance and in supply voltage variations.
- The inherent superimposed dither frequency helps to overcome friction and stiction effects in the controlled device.
- Supply line is protected against reversed polarity and load dump.
- Input is protected against short circuits to GND and supply.
- Output is protected against short circuits, reversed polarity, over-current and over-temperature.

Specifications

Operating voltage:	8.5-30 Vdc	
Max current consumption:	100mA (no load applied)	
Operating temperature:	-25 / +85 °C	
Degree of protection:	IP 67	
Analog input signal:	Standard:	0-5 V
	Option 1:	0-10 V
	Option 2:	0-20 mA
Input impedance:	50k Ohm	
Typical ctrl pot resistance:	2 - 47k Ohm	
Current output range (PWM):	100-3000 mA	
PWM dither frequency:	55-200 Hz (adjustable)	
Adjustable ramp time:	0.05 - 5 s	

Dimensions



Applications

- Primary applications are the control of non-feedback pressure and flow proportional valves to attain smooth acceleration/deceleration and fine-metering control of linear and rotary actuators

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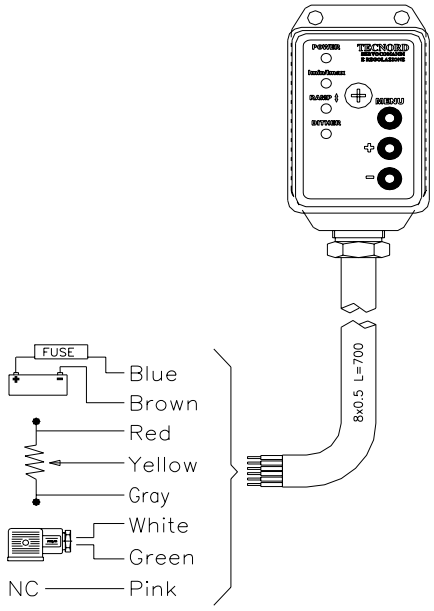
Circuit board pinout - Wiring diagram

Wiring Color Codes

Blue	+Battery
Brown	-Battery (GND)
Red	Command signal supply (+5V)
Yellow	Command signal in
Gray	Command signal GND
White	Proportional coil output
Green	Proportional coil current feedback line
Pink	Spare / Not used



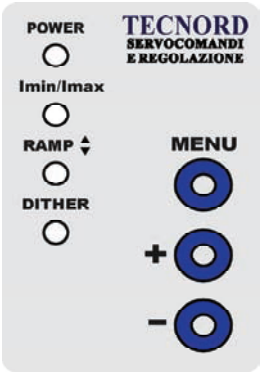
Fuse

A 5A fuse must be inserted on the BLUE wire connecting the EC-MPC1 driver to the power source.

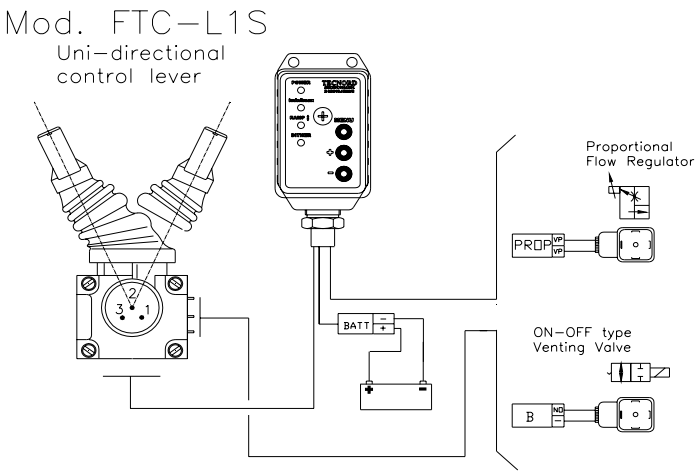
Adjustments

The following adjustments can be made directly from the front key-pad by selecting the 3-pushpins in various combinations:

- Imin (minimum output current)
- Imax (maximum output current)
- Ramp-up time
- Ramp-down time
- Dither frequency



Application example



Remote operation of a proportional flow control valve from single axis / unidirectional control lever incorporating a rotary potentiometer and a center / power-off switch for the energizing of an auxiliary solenoid-operated dump valve.

Ordering Information: ***EC - PWM - A1 - MPC1 - P***

A- = Adjustable

C = circuit board only
P = panel mounting

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EC - PWM - A1 - MPC1 - D

Description

Micro-processor based PWM electronic driver for remote control of a single proportional solenoid valve.

Operation

The EC-PWM-MPC1-D Proportional Valve driver supplies a solenoid with a *PWM (Pulse Width Modulated)* current proportional to the input signal from a potentiometer, PLC or other control systems

Adjustments of "Imin/Imax", "Ramp time", "Deadband" and "Dither" can be effected directly from a key-pad integrated on the front panel

Mounting option: Female DIN 43650 socket on valve's side and sheathed exit cable to connect to power source and remote control devices

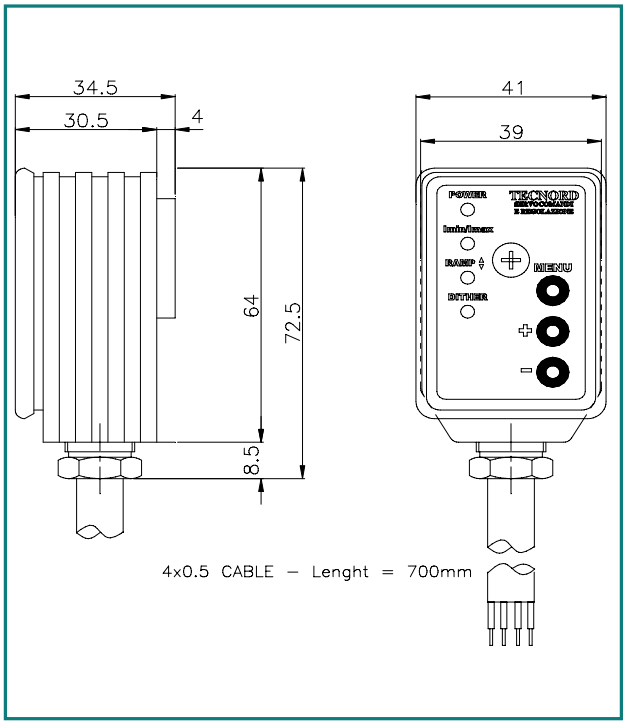
Features

- The current in the solenoid is independent of change in the coil resistance and in supply voltage variations.
- The inherent superimposed dither frequency helps to overcome friction and stiction effects in the controlled device.
- Supply line is protected against reversed polarity and load dump.
- Input is protected against short circuits to GND and supply.
- Output is protected against short circuits, reversed polarity, over-current and over-temperature.

Specifications

Operating voltage:	8.5-30 Vdc
Max current consumption:	100mA (no load applied)
Operating temperature:	-25 / +85 °C
Degree of protection:	IP 67
Analog input signal:	Standard: 0-5 V
	Option 1: 0-10 V
	Option 2: 0-20 mA
Input impedance:	50k Ohm
Typical ctrl pot resistance:	2 - 47k Ohm
Current output range (PWM):	100-3000 mA
PWM dither frequency:	55-200 Hz (adjustable)
Adjustable ramp time:	0.05 - 5 s

Dimensions



Applications

- 12 Vdc and 24 Vdc systems
- Stable control of proportional valves
- High resolution (10 bits) control
- Field - adjustable applications

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Circuit board pinout - Wiring diagram

Power Supply Wiring Color Codes

Blue	(+) Positive from Power Source
Yell./Green	(-) Negative from (GND)

Remote Potentiometer Wiring Color Codes

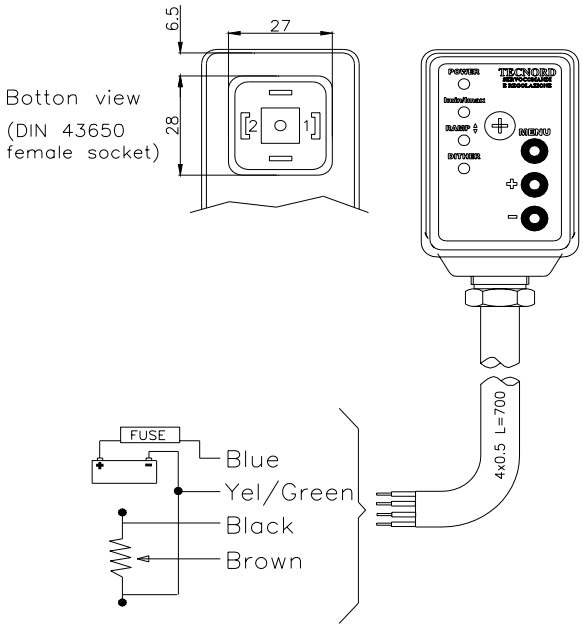
Black	Command signal supply (+5V)
Brown	Command signal in

Proportional Valves Wiring Color Codes

1	Proportional coil output
2	Proportional coil current feedback line

Fuse

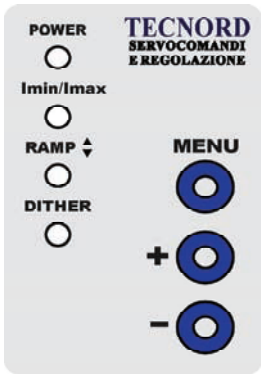
A 5A fuse must be inserted on the BLUE wire connecting the EC-MPC1 driver to the power source.



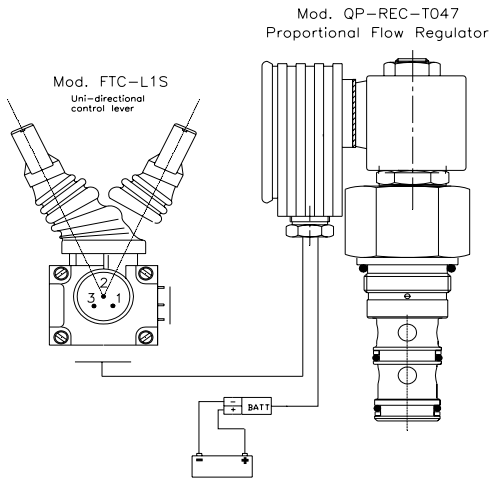
Adjustments

The following adjustments can be made directly from the front key-pad by selecting the 3-pushpins in various combinations:

- Imin (minimum output current)
- Imax (maximum output current)
- Ramp-up time
- Ramp-down time
- Dither frequency



Application example



Remote operation of a proportional flow control valve from single axis / unidirectional control lever incorporating a rotary potentiometer and a center / power-off switch

Ordering Information: ***EC - PWM - A1 - MPC1 - D***

A- = Adjustable

D = DIN 43650 socket connector

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EC - PWM - A1 - MPC1 - E

Description

Micro-processor based PWM electronic driver for remote control of a single proportional solenoid valve.

Operation

The EC-PWM-MPC1-D Proportional Valve driver supplies a solenoid with a *PWM (Pulse Width Modulated)* current proportional to the input signal from a potentiometer, PLC or other control systems

Adjustments of "Imin/Imax", "Ramp time", "Deadband" and "Dither" can be effected directly from a key-pad integrated on the front panel

Mounting option: Female DIN 43650 socket on valve's side and Male DIN 43650 plug to connect to power source and remote control devices

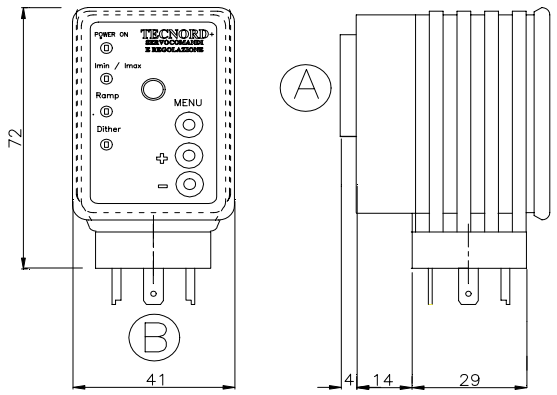
Features

- The current in the solenoid is independent of change in the coil resistance and in supply voltage variations.
- The inherent superimposed dither frequency helps to overcome friction and stiction effects in the controlled device.
- Supply line is protected against reversed polarity and load dump.
- Input is protected against short circuits to GND and supply.
- Output is protected against short circuits, reversed polarity, over-current and over-temperature.

Specifications

● Operating voltage:	8.5-30 Vdc	
● Max current consumption:	100mA (no load applied)	
● Operating temperature:	-25 / +85 °C	
● Degree of protection:	IP 67	
● Analog input signal:	Standard:	0-5 V
	Option 1:	0-10 V
	Option 2:	0-20 mA
● Input impedance:	50k Ohm	
● Typical ctrl pot resistance:	2 - 47k Ohm	
● Current output range (PWM):	100-3000 mA	
● PWM dither frequency:	55-200 Hz (adjustable)	
● Adjustable ramp time:	0.05 - 5 s	

Dimensions



A : EN 175301-803 Socket (Ex DIN 43650) (To Prop. Valve)
B : EN 175301-803 Plug (from Voltage supply and Remote Control Potentiometer)

Applications

- 12 Vdc and 24 Vdc systems
- Stable control of proportional valves
- High resolution (10 bits) control
- Field - adjustable applications

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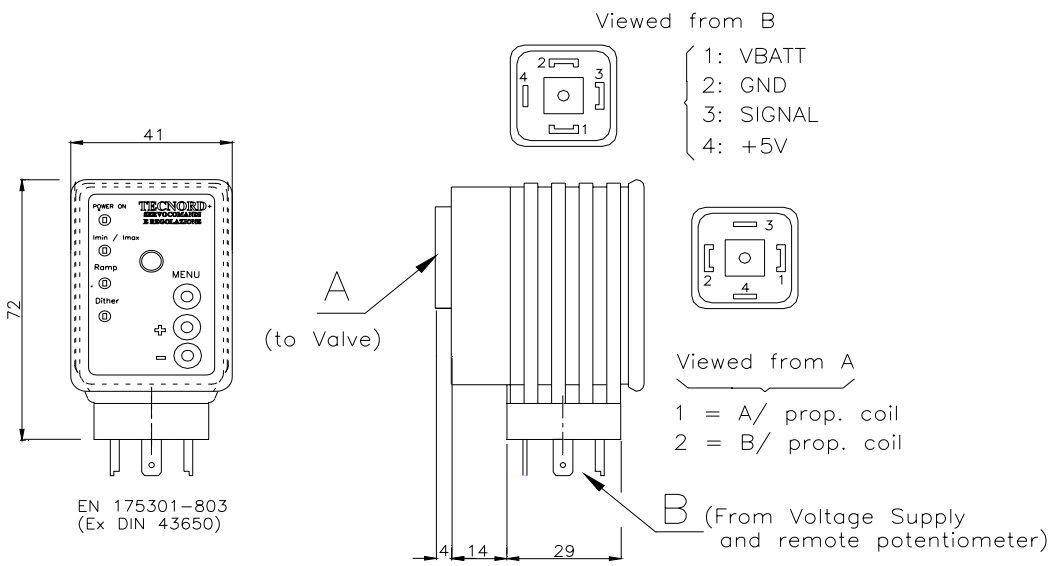
Circuit board pinout - Wiring diagram



Adjustments

The following adjustments can be made directly from the front key-pad by selecting the 3-pushpins in various combinations:

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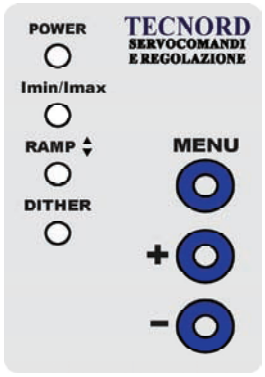
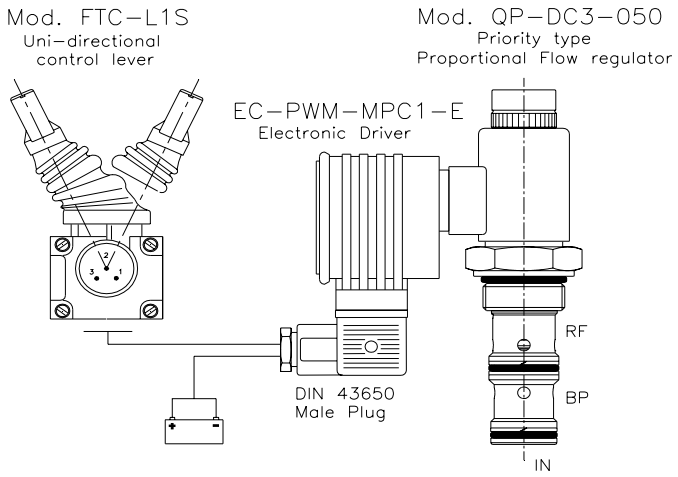
- Ramp-down time
- Dither frequency



Application example



Remote operation of a proportional flow control valve from a single axis / unidirectional control lever incorporating a rotary potentiometer and a center / power-off switch

Ordering Information: *EC - PWM - A1 - MPC1 - E*

A- = Adjustable

D = DIN 43650 socket connector

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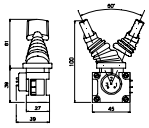
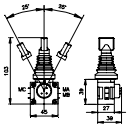
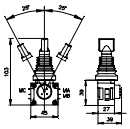
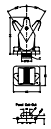
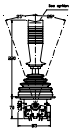
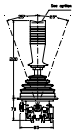
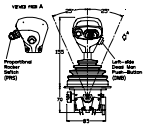
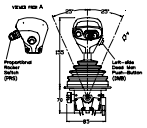
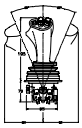
Electronic Joysticks and Switches

	Model/Description	Page
	Joystick Model Codes	674
	FTC-L1S/A0-IP-0	676
	FTC-L2S/E0-IP-0	677
	FTC-L2S/N0-IP-0	678
	JLP-L2S/Q0-IP-D	679
	JMF-L2S/F0-IC/0100	680
	JMF-L4C/NN-IC/0200	681
	JMF-L4C/FF-IE/A1P9/1PRS-0	682
	JMF-L4C/NN-IE/A1P9/1PRS-0	683
	JMF-L4C/NN-MG/A1P9/2PRS-0	684

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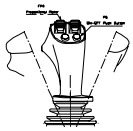
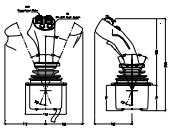


JMF-L4C/NN-MG/A2P9/2FPR 685

JHD-L4C/TT-IC/0100-3 686



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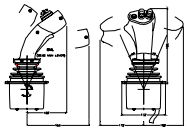

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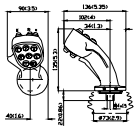
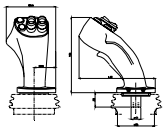


MG-A8P9-0000 689



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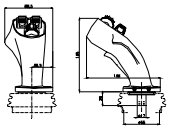

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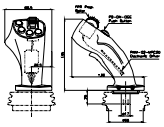

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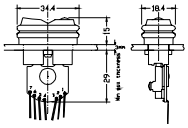
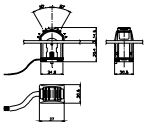


PRS-L2S-S0-0-0 693



FPR-L2S-SNCH 694

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Joystick Model Codes

JOYSTICKS

Proportional Control Levers - Joystick Controllers - Ergonomic Handles

MINI Series Control Levers

JLP Series / Low profile control levers

JMF Series multi-functions Joystick Controllers

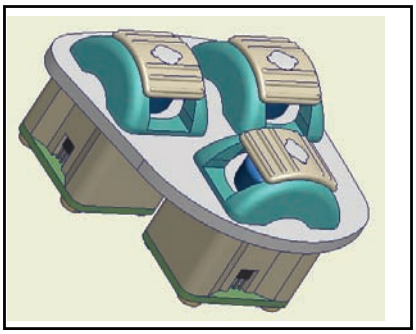
JHD Series multi-functions Joystick Controllers

IE Series Ergonomic Grips

MG Series Ergonomic Grips

FPR - Series proportional Roller Switches

PRS Series Proportional Rocker Switches



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Joystick Controllers

Cross Reference Table

JMF - L4C / MN - MG / A2P9 / 1FPR - 0

- JMF — Family & Type
- L4C — Main body configuration
- MN — Y-Y/X-X axes analog control configuration
- MG — Type of grip
- A2P9 — Z-Z / ON-OFF controls on handle
- 1FPR — K-K / Analog controls on handle
- 0 — Connector type

Tab1	FAMILY AND TYPE	FTC	JLP	JMF	JHD
SIZE		Mini	Mini	Large	Large
Y-Y / X-X AXES & LEVER MOVEMENTS CONFIGURATION		L1S L2S	L2S	L1S L2S L4C L4D	L1S L2S L4C L4D
L1S= Single Axis / Unidirectional L2S= Single axis / Bidirectional	L4C=Dual axes / Cross movement L4D= Multi-axes / All diagonals				
ANALOG CTRL DEVICES ON Y-Y/X-X AXES (See TAB 2 for ref. codes)		3-pin rotary 4-pin rotary	3&4-pin track	3-pin rotary 4-pin rotary	3-pin track 4-pin track
SWITCHED OUTPUTS ON Y-Y / X-X AXES (See TAB 2 for ref. codes)		1 at center 2 at center	2 at center	2 at center	2 at center
HANDLES & GRIPS DESIGNATION:		IP=Paddle IC= Round.	IP=Paddle	IL= Low Profile / No controls IC=Cylindrical / ON-OFF ctrls IE= E-Type / ON-OFF & Analog MG=Multi F / ON-OFF & Analog	
Z-Z On-off push buttons on IE and MG handles				A = 3A Dead Man lever P9 = 3 Amp NO push buttons AP= 200 mA NO push buttons	
K-K Proportional controls IE and MG on handles				PRS= Prop Rocker pot FPR= Prop. Roller pot	
OUTPUT CONNECTORS		0=None 1=AMP(pot only)	2=Dubox	0=None 1=AMP(Pot only)	3= Exit cable 4= Deutsch

Tab2	POTENTIOMETERS & SWITCHED COMBINATIONS	S=40%Vin		S= 50%Vin	S= 80%Vin	S=90%Vin	S=100%Vin
3-PINS ROTARY POT. /ANALOG TRACK ONLY				A		D	
3- PINS ROTARY POT. / 1 NEUTRAL-CENTER SWITCH (EMC)*				B		E	
3-PINS ROTARY POT. / 2 DIRECTIONAL SWITCHES (EMC)*				C		F	
4-PINS ROTARY POT. /ANALOG TRACK ONLY		G					L
4- PINS ROT. POT. / 1 NEUTRAL-CENTER SWITCH (EMC)*		H					M
4-PINS ROTARY POT. / 2 DIRECTIONAL SWITCHES (EMC)*		I					N
				S= 75%Vin	**S= 80%Vin**		**S=100%Vin**
3 & 4 PINS W/ ANALOG & SWITCHED OUTPUTS RESISTIVE TRACKS (RTR)					Q		R
3 - PINS ANALOG W/ SWITCHES (RTR)				O			S
4-PINS W/ ANALOG & SWITCHED OUTPUTS RESISTIVE TRACKS (RTR)				P			T
3-PINS HALL EFFECT SENSOR (Mod. FPR Prop. roller switch only):				U = Special 0.5 -4.5 V output signal / 2.5 V at rest			

(EMC)* = Electro - Mechanical Contact (RTR)** = Resistive Track

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

FTC-L1S/A0-IP-0

Features

. Single Axis / Unidirectional
. 3- Pins Rotary Potentiometers
. Optional Enable Switch

Mechanical Specifications

. Lever deflection angle:	50° +/- 1°
. Electrical angle:	50° +/- 1°
. Operating temperature range:	-25°C / + 80°C
. Protection class:	IP 65
. Life:	3 mill cycles

Electrical Specifications

Analog track (3-pins Rotary Pot)

. Electrical power rating:	0.25 W @ 25°C
. Ohmic resistance: / A=50% of Vin	1 k ohm +/- 20%
/ D=90% of Vin	2.5 k ohm +/- 20%
/ D=90% of Vin	5 k ohm +/-20%
. Max. operating input voltage (Vin):	48 V or +/-24V
. Min. load impedance on pin 2 (Signal)	50 k ohm
. Max. operating current on pin 2	1 mA
. Output voltage	See GRAPH 1
. Linearity	2% or better

Neutral Position Switch / EMC* type

. Contacts	Silver Plated
. Max. operating input voltage	48 V or +/-24V
. Max. operating current	1.5 A/inductive
. Neutral position switch threshold angle:	+ 4°
. Pot. connector type:	none
	1= AMP Modu / 4 poles

Potentiometer & Switches Options

Y-Y Axis (Main body) Pot.'s & Switches	REFERENCE CODES S=50% Vin	S=90% Vin
3-pin Pot	**A(Std)**	D
3-pin Pot & Neutral Switch	B	E

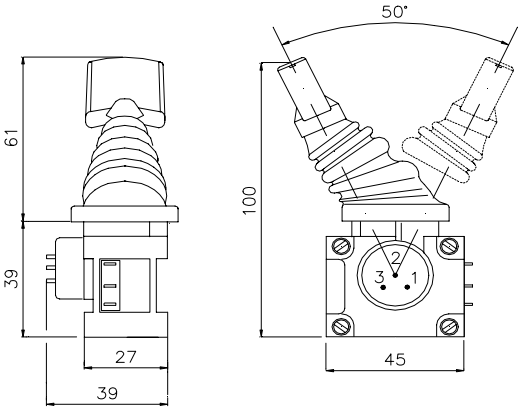
X-X Axis (Main body) Pot.'s & Switches	0 = NOT AVAILABLE
Z-Z Axis (Grip) ON-OFF controls	0 = NOT AVAILABLE
K-K Axis (Grip) Analog Controls	0 = NOT AVAILABLE

Wiring Diagram: *refer to SM-FTC-L2S Service Manual*

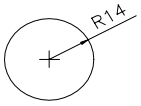
Mod. FTC-L1S/A0-IP-0

Mini / Fingertip proportional control lever

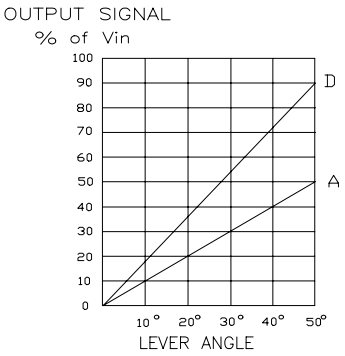
Overall Dimensions



Panel Cut-Out



Output Signal Control Characteristic



3-pins pot. configuration

Ordering Information

FTC - L1S/A0 - IP - *

0 = no exit connector
1= AMP Modu / 4 poles

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

FTC-L2S/E0-IP-0

Features

. Single Axis / Bi-Directional
. 3- Pins Rotary Potentiometers
. Optional Center/Power-off or Bi-Directional Switches

Mechanical Specifications

. Lever deflection angle:	+/- 25° +/- 1°
. Electrical angle:	+/-25° +/- 1°
. Operating temperature range:	-25°C / + 80°C
. Protection class:	IP 65
. Life:	3 mill cycles

Electrical Specifications

Analog track (3-Pins Rotary Pot)

. Electrical power rating:	0.25 W @ 25°C
. Ohmic resistance: / A=50% of Vin	1 k ohm +/- 20%
/ D=90% of Vin	2.5 k ohm +/- 20%
/ D=90% of Vin (Std)	5 k ohm +/-20%
. Max. operating input voltage (Vin):	48 V or +/-24V
. Min. load impedance on pin 2 (Signal)	50 k ohm
. Max. operating current on pin 2	1 mA
. Output voltage	See GRAPH 1
. Linearity	2% or better

Center/Power- off & Directional Switches / EMC* type

. Contacts	Silver Plated
. Max. operating input voltage	48 V or +/-24V
. Max. operating current	1.5 A/inductive
. Directional switches threshold angle:	+/- 4°
. Pot. connector type:	none
	1= AMP Modu / 4 poles

Potentiometer & Switches Options

Y-Y Axis (Main body) Pot.'s & Switches	REFERENCE CODES S=50% Vin	S=90% Vin
3-pin Pot	A	D
3-pin Pot & Center Switch	B	**E(Std)**
3-pin Pot & Bi-Dir. Switch	C	F

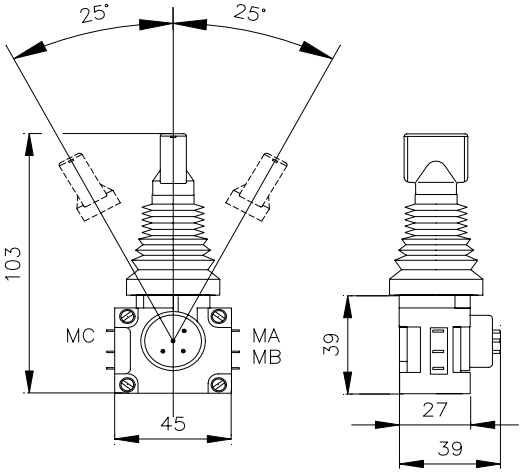
X-X Axis (Main body) Pot.'s & Switches	0 = NOT AVAILABLE
Z-Z Axis (Grip) ON-OFF controls	0 = NOT AVAILABLE
K-K Axis (Grip) Analog Controls	0 = NOT AVAILABLE

Wiring Diagram: *refer to SM-FTC-L2S Service Manual*

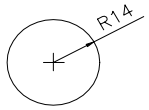
Mod. FTC- L2S /E0 - IP - 0

Mini / Fingertip proportional control lever

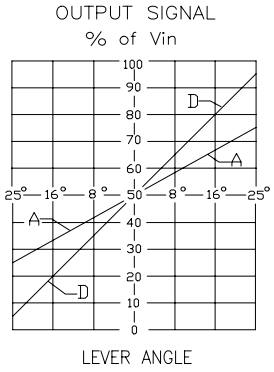
Overall Dimensions



Panel Cut-Out



Output Signal Control Characteristic



4-pins pot. configuration

Ordering Information

Mod. FTC - L2S /E0 - IP - *

0 = no exit connector
1= AMP Modu / 4 poles

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FTC-L2S/N0-IP-0

Features

. Panel mounting style
. 4- Pins - Center Tap Rotary Potentiometer
. Optional Center/Power-off or Bi-Directional Switches

Mechanical Specifications

. Lever deflection angle:	+/- 25° +/- 1°
. Electrical angle:	+/-25° +/- 1°
. Operating temperature range:	-25°C / + 85°C
. Protection class:	IP 65
. Life:	3 mill cycles

Electrical Specifications

Analog track (4-Pins Rotary Pot)

. Electrical power rating:	0.25 W @ 25°C
. Ohmic resistance: / G=40% of Vin	10 k ohm +/- 20%
/ L=100% of Vin	5 k ohm +/- 20%
. Max. operating input voltage (Vin):	48 V or +/-24V
. Min. load impedance on pin 2 (Signal)	50 k ohm
. Max. operating current on pin 2	1 mA
. Output voltage	See GRAPH 1
. Linearity	2% or better

Center/Power- off & Directional Switches / EMC* type

. Contacts	Silver Plated
. Max. operating input voltage	48 V or +/-24V
. Max. operating current	1.5 A/inductive
. Directional switches threshold angle:	+/- 4°
. Pot. connector type:	none
	1= AMP Modu / 4 poles

Potentiometers & Switches Options

Y-Y Axis (Main body)	REFERENCE CODES	
Pot.'s & Switches	S=40% Vin	S=100% Vin
4-pin Pot	G	L
4-pin Pot & Center Switch	H	M
4-pin Pot & Bi-Dir. Switch	I	**N (Std)**

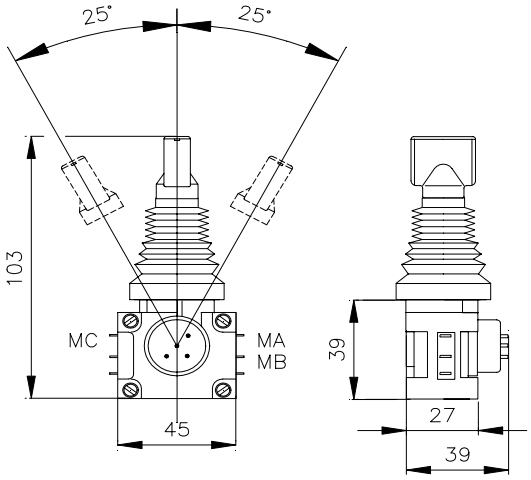
X-X Axis (Main body) Pot.'s & Switches	0 = NOT AVAILABLE
Z-Z Axis (Grip) ON-OFF controls	0 = NOT AVAILABLE
K-K Axis (Grip) Analog Controls	0 = NOT AVAILABLE

Wiring Diagram: *refer to SM-FTC-L2S Service Manual*

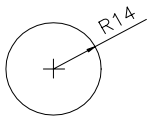
Mod. FTC- L2S / N 0 - IP - 0

Mini / Fingertip proportional control lever

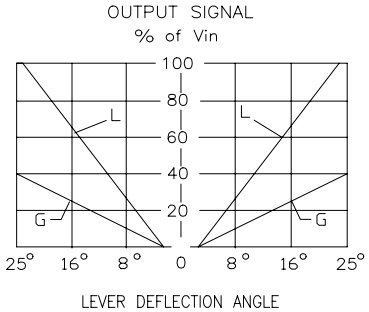
Overall Dimensions



Panel Cut-Out



Output Signal Control Characteristic



Ordering Information

Mod. FTC - L2S / N0 - IP - *

0 = no exit connector
1= AMP Modu / 4 poles

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

JLP-L2S/Q0-IP-D

Features

. Panel mounting style
. 3 pins & 4 pins / center tap potentiometer configuration
. 2 directional center / power-off switches

Mechanical Specifications

. Lever deflection angle:	+/- 32° +/- 1°
. Electrical angle:	+/- 30° +/- 1°
. Operating temperature range:	-25°C / + 85°C
. Protection class:	IP 65
. Life:	3 mill cycles

Electrical Specifications

Potentiometer (Analog Track)

. Electrical power rating:	0.25 W @ 25°C
. Ohmic resistance : / 080 version	5 k ohm +/- 20%
/ 100 version	4 k ohm +/- 20%
. Max. operating input voltage (Vin):	48 V or +/-24V
. Min. load impedance on pin 5 (Signal)	50 k ohm
. Max. operating current on pin 5	1 mA
. Output voltage / 080 version	80% of Vin
/ 100 version	100% of Vin
. Linearity	2% or better

Directional Switches

. Typical track resistance:	150 Ohm
. Max. operating input voltage	48 V or +/-24V
. Min. load impedance on pins 2&3 :	50 k ohm
. Max. operating current on pins 2&3	1 mA
. Directional switches threshold angle:	+/- 4°
. Connector type:	7 pin DUBOX
	Mod. 76382.407

Potentiometer & Switches Options

Y-Y Axis (Main body)	REFERENCE CODES	
Pot.'s & Switches	S=80% Vin	S=100% Vin
3-4pin Pot & Bi-Dir Switch	Q	R

X-X Axis (Main body)	0 = NOT AVAILABLE
Pot.'s & Switches	

Z-Z Axis (Grip)	0 = NOT AVAILABLE
ON-OFF controls	

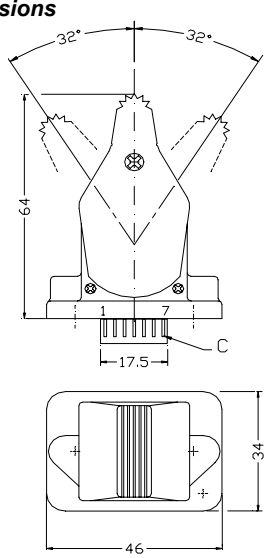
K-K Axis (Grip)	0 = NOT AVAILABLE
Analog Controls	

Wiring Diagram: *refer to SM-JLP-L2S Service Manual*

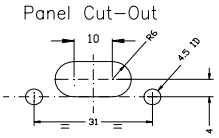
Mod. JLP-L2S / Q0 - IP - D

Single Axis / Bi-directional
Low profile / Fingertip proportional control lever

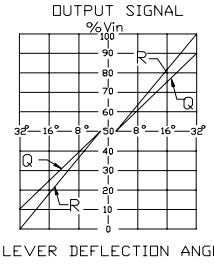
Overall Dimensions



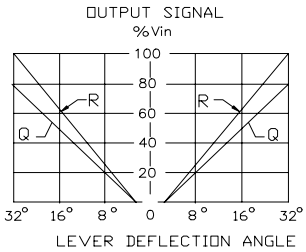
Panel Cut-Out



Output Signal Control Characteristic



3-pins pot. configuration



4-pins pot. configuration

Ordering Information

JLP - L2S / Q0 - IP - D

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

JMF-L2S/F0-IC/0100

Features

. 3 pins Rotary Potentiometers
. Optional Bi-directional Switches
. Cylindrical grip with *DEAD MAN* button or Rocker Switch

Mechanical Specifications

. Lever deflection angle:	+/- 25° +/- 1°
. Electrical angle:	+/- 25° +/- 1°
. Operating temperature range:	-25°C / + 80°C
. Protection class:	IP 65
. Life:	3 mill cycles

Electrical Specifications

Analog track (3-Pins Rotary Pot)

. Electrical power rating:	0.25 W @ 25°C
. Ohmic resistance: / A=50% of Vin	1 k ohm +/- 20%
/ D=90% of Vin	2.5 k ohm +/- 20%
/ D=90% of Vin (Std)	5 k ohm +/-20%
. Max. operating input voltage (Vin):	48 V or +/-24V
. Min. load impedance on pin 2 (Signal)	50 k ohm
. Max. operating current on pin 2	1 mA
. Output voltage	See GRAPHS
. Linearity	2% or better

Directional Switches / EMC* type

. Contacts	Silver Plated
. Max. operating input voltage	48 V or +/-24V
. Max. operating current	3 A/ Inductive
. Pot. connector type:	none
	1= AMP Mode / 4 poles

Potentiometers & Switches Options

Y-Y Axis (Main body)	REFERENCE CODES	
Pot.'s & Switches	S=50% Vin	S=90% Vin
3-pin Pot	A	D
3-pin Pot & Bi-Dir Switch	C	**F (Std)**

X-X Axis (Main body)	REFERENCE CODES	
Pot.'s & Switches	S=50% Vin	S=90% Vin
3-pin Pot	A	D
3-pin Pot & Bi-Dir Switch	C	**F (Std)**

Z-Z Axis (IC Grip)	REFERENCE CODES
ON-OFF controls	
No push button	0000
Top NO push button	0100
Top rocker switch	0200

K-K Axis (IC Grip)	0 = NOT AVAILABLE
Analog Controls	

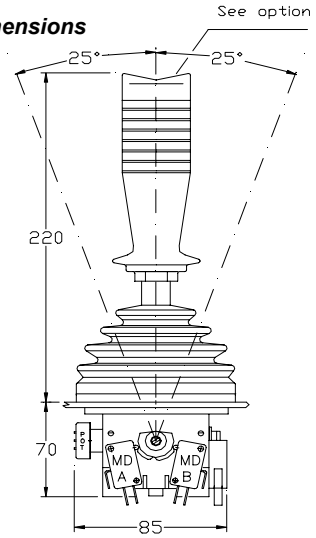
Wiring Diagram: *refer to SM-JMF-L4C Service Manual*

Mod JMF-L2S/F0-IC/0100

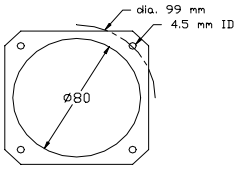
Heavy Duty / Multi-Axis Joystick Controller with IC Cylindrical Grip

Option ***L1S***	*Single axis control / Uni-Directional*
Option ***L2S***	*Single axis control / Bi-directional*
Option ***L4C***	*Cross axis control / Bi-directional*
Option ***L4D***	*Multi-axis control / Bi-directional*

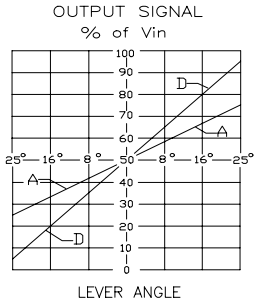
Overall Dimensions



Panel Cut-Out



Output Signal Control Characteristic



Ordering Information

JMF - L** / °° - IC / z z z z

*** = 1S /2S /4C /4D (main body configuration)*
°° = AA / CC / DD / FF (type of pots on main body)
z z z z = 0000 /0100/0200 (push buttons on grip)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

JMF-L4C/NN-IC/0200

Features

. 4- Pins - Center Tap Rotary Potentiometers
. Optional Bi-Directional Switches
. Cylindrical grip with *DEAD MAN* button or Rocker Switch

Mechanical Specifications

. Lever deflection angle:	+/- 25° +/- 1°
. Electrical angle:	+/- 25° +/- 1°
. Operating temperature range:	-25°C / + 80°C
. Protection class:	IP 65
. Life:	3 mill cycles

Electrical Specifications

Analog track (4-Pins Rotary Pot)

. Electrical power rating:	0.25 W @ 25°C
. Ohmic resistance: / G=40% of Vin	10 k ohm +/- 20%
/ L=100% of Vin	5 k ohm +/- 20%
. Max. operating input voltage (Vin):	48 V or +/-24V
. Min. load impedance on pin 2 (Signal)	50 k ohm
. Max. operating current on pin 2	1 mA
. Output voltage	See GRAPHS
. Linearity	2% or better

Directional Switches / EMC* type

. Contacts	Silver Plated
. Max. operating input voltage	48 V or +/-24V
. Max. operating current	3 A/ Inductive
. Pot. connector type:	none
	1= AMP Modu / 4 poles

Potentiometers & Switches Options

Y-Y Axis (Main body)	REFERENCE CODES	
Pot.'s & Switches	S=40% Vin	S=100% Vin
4-pin Pot	G	L
4-pin Pot & Bi-Dir. Switch	I	**N (Std)**

X-X Axis (Main body)	REFERENCE CODES	
Pot.'s & Switches	S=40% Vin	S=100% Vin
4-pin Pot	G	L
4-pin Pot & Bi-Dir. Switch	I	**N (Std)**

Z-Z Axis (IC Grip)	REFERENCE CODES
ON-OFF controls	
No push button	0000
Top NORM. OPEN push button	0100
Top rocker switch	0200

K-K Axis (IC Grip)	0 = NOT AVAILABLE
Analog Controls	

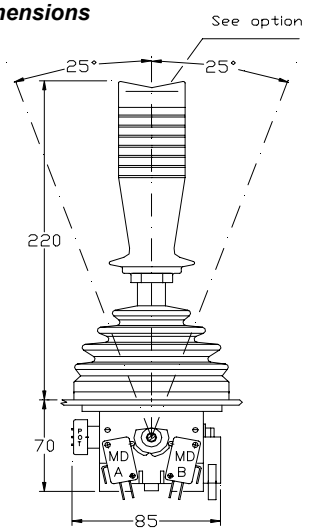
Wiring Diagram: *refer to SM-JMF-L4C Service Manual*

Mod. JMF-L4C /NN-IC/0200

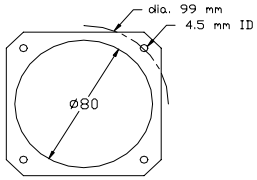
Heavy Duty / Multi-Axis Joystick Controller with IC Cylindrical Grip

Option ***L1S***	*Single axis control / Uni-Directional*
Option ***L2S***	*Single axis control / Bi-directional*
Option ***L4C***	*Cross axis control / Bi-directional*
Option ***L4D***	*Multi-axis control / Bi-directional*

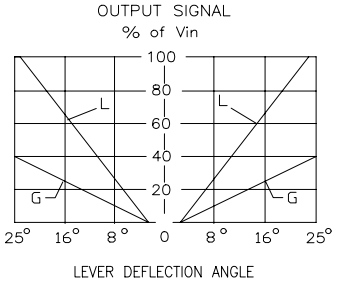
Overall Dimensions



Panel Cut-Out



Output Signal Control Characteristic



Ordering Information

JMF - L** / °° -IC / z z z z

*** = 2S /4C /4D (main body configuration)*
°° = GG / I I / L L / N N (type of pots on main body)
z z z z= 0000 /0100/0200 (push buttons on grip)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

JMF-L4C/FF-IE/A1P9/1PRS-0

Features

. 3 pins Rotary Potentiometers
. Optional Bi-Directional Switches
. IE type handle

Mechanical Specifications

. Lever deflection angle:	+/- 25° +/- 1°
. Electrical angle:	+/- 25° +/- 1°
. Operating temperature range:	-25°C / + 80°C
. Protection class:	IP 65
. Life:	3 mill cycles

Electrical Specifications

Analog track (3-Pins Rotary Pot)

. Electrical power rating:	0.25 W @ 25°C
. Ohmic resistance: / A=50% of Vin	1 k ohm +/- 20%
/ D=90% of Vin	2.5 k ohm +/- 20%
/ D=90% of Vin (Std)	5 k ohm +/-20%
. Max. operating input voltage (Vin):	48 V or +/-24V
. Min. load impedance on pin 2 (Signal)	50 k ohm
. Max. operating current on pin 2	1 mA
. Output voltage	See GRAPHS
. Linearity	2% or better

Directional Switches / EMC* type

. Contacts	Silver Plated
. Max. operating input voltage	48 V or +/-24V
. Max. operating current	3 A/ Inductive
. Directional switches threshold angle:	+/- 4°
. Pot. connector type:	none
	1= AMP Modu / 4 poles

Potentiometers & Switches Options

(Y-Y & X-X Axis)	REFERENCE CODES	
Pot.'s & Switches	S=50% Vin	S=90% Vin
3-pin Pot	A	D
3-pin Pot & Bi-Dir Switch	C	**F (Std)**

Z-Z Axis (IE Grip)	REFERENCE CODES
ON-OFF controls	Side & Front panel
No push buttons	0000
Side DEAD MAN push button	A000
1-2-3 push buttons / P9 - 3 Amp	01P9 - 02P9 - 03P9
1-2-3 push buttons / AP - 200 mA	01AP -02AP -03AP

K-K Axis (IE Grip)	REFERENCE CODES
Analog Controls	
No PRS (Prop. Rocker Switch)	0000
No.FPR (Prop. roller)	0000
1 x PRS	1PRS
1x FPR	1FPR

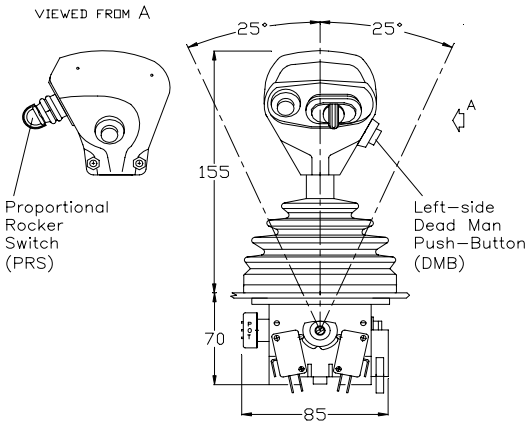
Wiring Diagram: *refer to SM-JMF-L4C Service Manual*

Mod. JMF - L4C/FF-IE/A1P9/1PRS-0

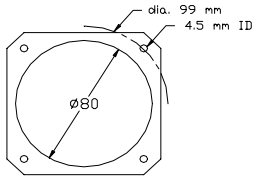
Heavy Duty / Multi-Axis Joystick Controller
with IE Multi-Function ergonomic grip

*Option **L1S**:*	*Single axis control / Uni-Directional*
*Option **L2S***	*Single axis control / Bi-directional*
*Option **L4C***	*Cross axis control / Bi-directional*
*Option **L4D***	*Multi-axis control / Bi-directional*

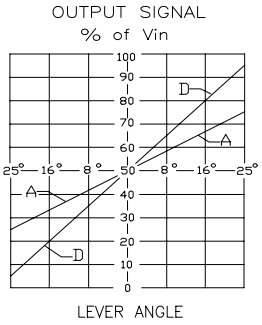
Overall Dimensions



Panel Cut-Out



Output Signal Control Characteristic



Ordering Information

JMF - L** / °° -IE / z z z z / k k k k

*** = 1S /2S /4C /4D (main body configuration)*
°° = AA / CC / DD / FF (type of pots on main body)
z z z z = 01P9 /02P9 /…./A3AP (push buttons on grip)
k k k k = 1PRS/2PRS/1FPR/2FPR

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

JMF-L4C/NN-IE/A1P9/1PRS-0

Features

. 4- Pins - Center Tap Rotary Potentiometers
. Optional Bi-Directional Switches
. IE type handle Designed to be operated with the palm of the hand

Mechanical Specifications

. Lever deflection angle:	+/- 25° +/- 1°
. Electrical angle:	+/- 25° +/- 1°
. Operating temperature range:	-25°C / + 80°C
. Protection class:	IP 65
. Life:	3 mill cycles

Electrical Specifications

Analog track (4-Pins Rotary Pot)

. Electrical power rating:	0.25 W @ 25°C
. Ohmic resistance: / G=40% of Vin	10 k ohm +/- 20%
/ L=100% of Vin	5 k ohm +/- 20%
. Max. operating input voltage (Vin):	48 V or +/-24V
. Min. load impedance on pin 2 (Signal)	50 k ohm
. Max. operating current on pin 2	1 mA
. Output voltage	See GRAPHS
. Linearity	2% or better

Directional Switches / EMC* type

. Contacts	Silver Plated
. Max. operating input voltage	48 V or +/-24V
. Max. operating current	3 A/ Inductive
. Directional switches threshold angle:	+/- 4°
. Pot. connector type:	none
	1= AMP Modu / 4 poles

Potentiometers & Switches Options

(Y-Y & X-X Axis)	REFERENCE CODES	
Pot.'s & Switches	S=40% Vin	S=100% Vin
4-pin Pot	G	L
4-pin Pot & Bi-Dir. Switch	I	**N (Std)**

Z-Z Axis (IE Grip)	REFERENCE CODES
ON-OFF controls	
No push buttons	0000
Side DEAD MAN push button	A000
1-2-3 push buttons / P9 - 3 Amp	01P9 - 02P9 - 03P9
1-2-3 push buttons / AP - 200 mA	01AP -02AP -03AP

K-K Axis (IE Grip)	REFERENCE CODES
Analog Controls	
No PRS (Prop. Rocker Switch)	0000
No FPR (Prop. roller)	0000
1 x PRS	1PRS
1 x FPR	1FPR

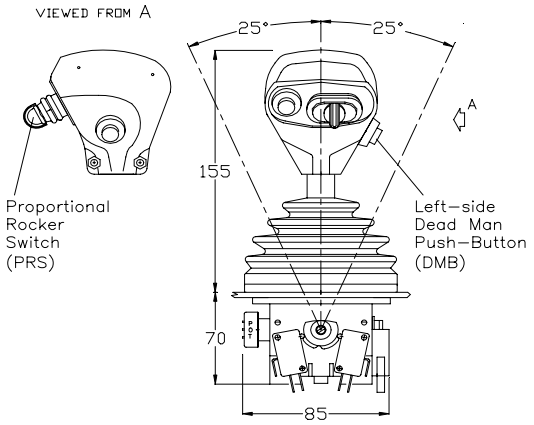
Wiring Diagram: *refer to SM-JMF-L4C Service Manual*

Mod. JMF - L4C/NN-IE/A1P9/1PRS-0

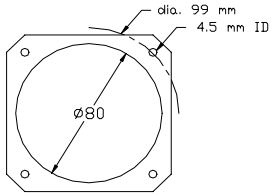
Heavy Duty / Multi-Axis Joystick Controller
with IE Multi-Function ergonomic grip

*Option **L1S**:*	*Single axis control / Uni-Directional*
*Option **L2S***	*Single axis control / Bi-directional*
*Option **L4C***	*Cross axis control / Bi-directional*
*Option **L4D***	*Multi-axis control / Bi-directional*

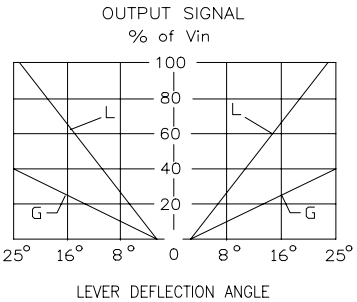
Overall Dimensions



Panel Cut-Out



Output Signal Control Characteristic



4-pins pot configuration

Ordering Information

JMF - L** / °° -IE / z z z z / k k k k

** = 2S /4C /4D (main body configuration)
°° = GG / I I / L L/ N N (type of pots on main body)
z z z z = 01P9 /02P9 /…./A3AP (push buttons on grip)

k k k k = 1PRS / 2PRS / 1FPR / 2FPR

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

JMF-L4C/NN-MG/A1P9/2PRS-0

Features

. 3-pins and 4- Pins/ Center Tap Rotary Potentiometers
. Optional Center / power-off and Bi-Directional Switches
. MG- type ergonomic grip with PRS / Prop. Rocker Switches

Mechanical Specifications

. Lever deflection angle:	+/- 25° +/- 1°
. Electrical angle:	+/- 25° +/- 1°
. Operating temperature range:	-25°C / + 80°C
. Protection class:	IP 65
. Life:	3 mill cycles

Electrical Specifications

Analog track (4-Pins Rotary Pot)

. Electrical power rating:	0.25 W @ 25°C
. Ohmic resistance: / G=40% of Vin	10 k ohm +/- 20%
/ L=100% of Vin	5 k ohm +/- 20%
. Max. operating input voltage (Vin):	48 V or +/-24V
. Min. load impedance on pin 2 (Signal)	50 k ohm
. Max. operating current on pin 2	1 mA
. Output voltage	See GRAPHS
. Linearity	2% or better

Directional Switches / EMC* type

. Contacts	Silver Plated
. Max. operating input voltage	48 V or +/-24V
. Max. operating current	3 A/ Inductive
. Directional switches threshold angle:	+/- 4°
. Pot. connector type:	0 = none
	1= AMP Modu / 4 poles

Potentiometers & Switches Options

(Y-Y & X-X Axis)	REFERENCE CODES	
Pot.'s & Switches	S=40% Vin	S=100% Vin
4-pin Pot	G	L
4-pin Pot & Bi-Dir. Switch	I	**N (Std)**

Z-Z Axis (MG Grip)	REFERENCE CODES
ON-OFF controls	
No push buttons	0000
Side DEAD MAN push button	A000
1-2-3….8 push buttons / P9 - 3 Amp	01P9 - 02P9 - …08P9
1-2-3…8 push buttons / AP - 200 mA	01AP -02AP -…08AP

K-K Axis (MG Grip)	REFERENCE CODES
Analog Controls	
No PRS (Prop. Rocker Switch)	0000
1 x PRS	1PRS
2 x PRS	2PRS
3 x PRS	3PRS

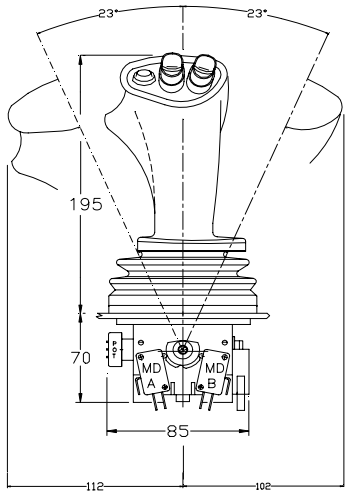
Wiring Diagram: *refer to SM-JMF-L4C Service Manual*

Mod. JMF - L4C/NN-MG/A1P9/2PRS-0

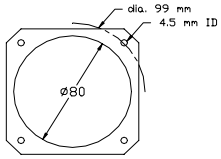
Heavy Duty / Multi-Axis Joystick Controller
with MG Multi-Function ergonomic grip

*Option **L1S** :*	*Single axis control / Uni-Directional*
*Option **L2S***	*Single axis control / Bi-directional*
*Option **L4C***	*Cross axis control / Bi-directional*
*Option **L4D***	*Multi-axis control / Bi-directional*

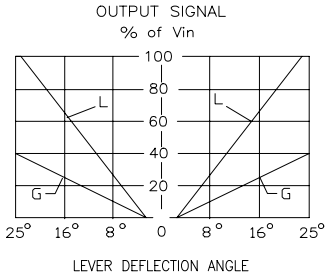
Overall Dimensions



Panel Cut-Out



Output Signal Control Characteristic



4-pins pot configuration

Ordering Information

JMF - L** / °° -MG / z z z z / k k k k - **

** = 2S /4C /4D (main body configuration)
°° = GG / I I / L L/ N N (type of 4-pins pots on main body)
z z z z = 01P9 /08P9 /…./A8AP (push buttons on grip)
k k k k = 1PRS / 2PRS / 3PRS
* = 0 / 1 (Connector type option)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

JMF-L4C/NN-MG/A2P9/2FPR

Features:

. 3-pins and 4- Pins/ Center Tap Rotary Potentiometers
. Optional Center / power-off and Bi-Directional Switches
. MG- type ergonomic grip with FPR Prop. Rollers

Mechanical Specifications

. Lever deflection angle:	+/- 25° +/- 1°
. Electrical angle:	+/- 25° +/- 1°
. Operating temperature range:	-25°C / + 80°C
. Protection class:	IP 65
. Life:	3 mill cycles

Electrical Specifications

Analog track (4-Pins Rotary Pot)

. Electrical power rating:	0.25 W @ 25°C
. Ohmic resistance: / G=40% of Vin	10 k ohm +/- 20%
/ L=100% of Vin	5 k ohm +/- 20%
. Max. operating input voltage (Vin):	48 V or +/-24V
. Min. load impedance on pin 2 (Signal)	50 k ohm
. Max. operating current on pin 2	1 mA
. Output voltage	See GRAPHS
. Linearity	2% or better

Directional Switches / EMC* type

. Contacts	Silver Plated
. Max. operating input voltage	48 V or +/-24V
. Max. operating current	3 A/ Inductive
. Directional switches threshold angle:	+/- 4°
. Connectors:	0 = none (Std)

Potentiometers & Switches Options

(Y-Y & X-X Axis)	REFERENCE CODES	
Pot.'s & Switches	S=40% Vin	S=100% Vin
4-pin Pot	G	L
4-pin Pot & Bi-Dir. Switch	I	**N (Std)**

Z-Z Axis (MG Grip)	REFERENCE CODES
ON-OFF controls	
No push buttons	0000
Side DEAD MAN push button	A000
1-2-3….8 push buttons / P9 - 3 Amp	01P9 - 02P9 - …08P9
1-2-3…8 push buttons / AP - 200 mA	01AP -02AP -…08AP

K-K Axis (MG Grip)	REFERENCE CODES
Analog output (Hall effect sensor / 1-5 V output signal)	
No FPR (Prop. Roller)	0000
1 x FPR	1FPR
2 x FPR	2FPR
3 x FPR	3FPR

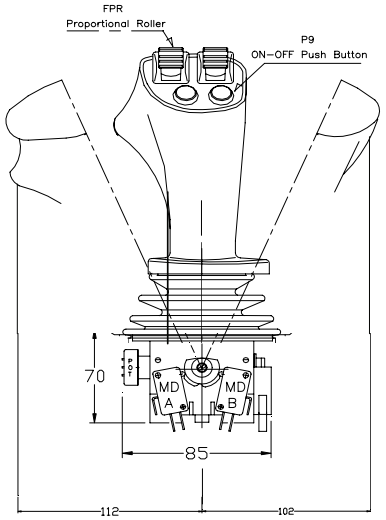
Wiring Diagram: *refer to SM-JMF-L4C Service Manual*

Mod. JMF - L4C/NN-MG/A2P9/2FPR

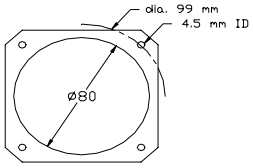
Heavy Duty / Multi-Axis Joystick Controller
with MG Multi-Function ergonomic grip

*Option **L2S***	*Single axis control / Bi-directional*
*Option **L4C***	*Cross axis control / Bi-directional*
*Option **L4D***	*Multi-axis control / Bi-directional*

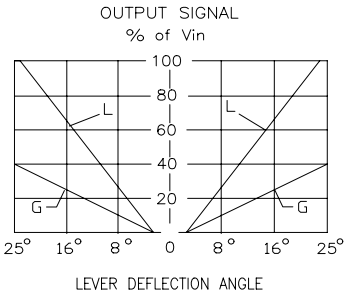
Overall Dimensions



Panel Cut-Out



Output Signal Control Characteristic



4-pins pot configuration

Ordering Information

JMF - L** / °° -MG / z z z z / k k k k

*** = 2S /4C /4D (main body configuration)*
°° = GG / I I / L L/ N N (type of 4-pins pots on main body)
z z z z = 01P9 /08P9 /…./A8AP (push buttons on grip)
k k k k = 1FPR / 2FPR /3FPR

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

JHD-L4C/TT-IC/0100-3

Features:

. 3-pins or 4- Pins / Center Tap / RTR (Resistive track)
. Optional Center Bi-Directional Switches
. IC type handle with single/NO and rocker switch push buttons

Mechanical Specifications

. Lever deflection angle:	+/- 25° +/- 1°
. Electrical angle:	+/- 25° +/- 1°
. Operating temperature range:	-25°C / + 80°C
. Protection class:	IP 65
. Life:	3 mill cycles

Electrical Specifications

Analog track (4-Pins Rotary Pot)

. Electrical power rating:	0.25 W @ 25°C
. Ohmic resistance: / O & P Pot.Options	5 k ohm +/- 20%
/ S & T Pot. Options	3.75 k ohm +/- 20%
. Max. operating input voltage (Vin):	48 V or +/-24V
. Min. load impedance on pin 5 (Signal)	50 k ohm
. Max. operating current on pin 5	1 mA
. Output voltage / O & P Pot. Options	75% of Vin
/ S & T Pot. Options	100% of Vin
. Linearity	2% or better

Low amperage directional switches on base joystick

. Typical track resistance:	150 Ohm
. Max. operating input voltage	48 V or +/-24V
. Min. load impedance on pins 2&3 :	50 k ohm
. Max. operating current on pins 2&3	1 mA
. Directional switches threshold angle:	+/- 4°
. Connector type:	3 =16 poles cable (Std)
	4= Deutsch HD14-9-16P

Potentiometers & Switches Options

(Y-Y & X-X Axis)	REFERENCE CODES	
Pot.'s & Switches	O/P=75	S/T=100%
3-pin Pot	O	S
4-pin Pot & Bi-Dir Switch	P	T

Z-Z Axis (IC Grip)	REFERENCE CODES
ON-OFF controls	
No push button	0000
Top NORM. OPEN push button	0100
Top rocker switch	0200

K-K Axis (IC Grip)	0 = NOT AVAILABLE
Analog Controls	

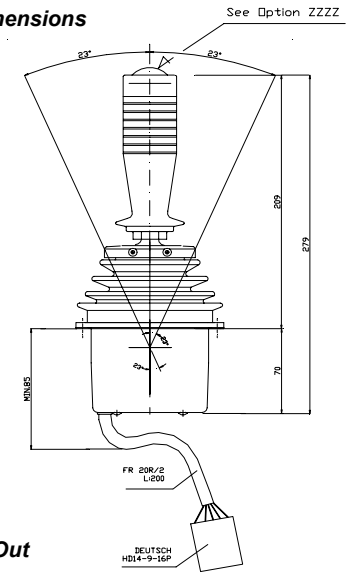
Wiring Diagram: *refer to SM-JHD-L4C Service Manual*

Mod. JHD - L4C/TT-IC/0100- 3

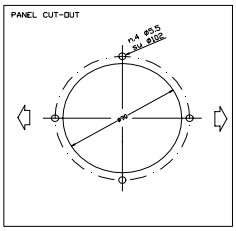
Heavy Duty / Multi-Axis Joystick Controller with IC Cylindrical Grip

*Option **L2S***	*Single axis control / Bi-directional*
*Option **L4C***	*Cross axis control / Bi-directional*
*Option **L4D***	*Multi-axis control / Bi-directional*

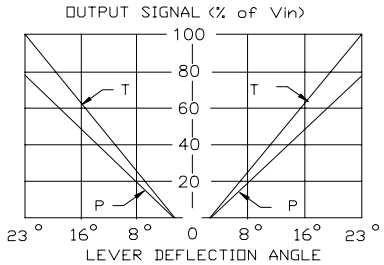
Overall Dimensions



Panel Cut-Out



Output Signal Control Characteristic



4-pins pot configuration

Ordering Information

JHD - L** / °° - IC / z z z z - ***

** = 2S /4C /4D (main body configuration)
°° = OO / PP / SS/ TT (type of 3/4-pins pots on main body)
z z z z = 0100 /0200 (push buttons on grip)
* = 3 / 4 (Exit connector type)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

JHD-L4C/TT-MG/A2P9/2FPR-3

Mod. JHD-L4C/TT-MG/A2P9/2FPR-3

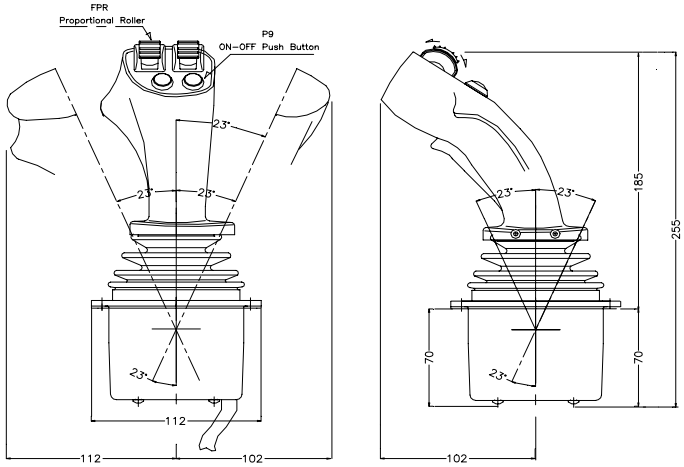
Heavy Duty / Multi-Axis Joystick Controller
with MG Multi-Function ergonomic grip and FPR Prop. Rollers

Features

Mod. ***JHD-L4C*** joystick controller has been designed for use in Mobile Equipment applications in conjunction with TECNORD ***MMS*** electronic drivers to generate analogue and switched signals proportional to the lever deflection angle for the remote control of electro-hydraulic PROPORTIONAL or ON-OFF hydraulic valves of any type and make. A center tap analog track provides an accurate voltage reference for the center position

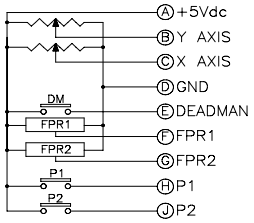
The ***M G*** range of ergonomic handles adopted for this line of joysticks controllers integrates the widest variety of ON-OFF push buttons and PROPORTIONAL ROLLER switches. When coupled with a two - axis base-joystick, up to 3-4-5 analog axes and 2 to 9 ON-OFF push buttons can be integrated in the same joystick package.

Overall dimensions

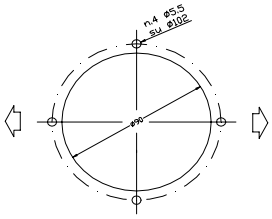


Mechanical Specifications

. Option ***L2S***	*Single axis control / Bi-dir.*
. Option ***L4C***	*Cross axis control / Bi-dir.*
. Option ***L4D***	*Multi-axis control / Bi-dir.*
. Operating temp. range:	-25°C / +80°C
. Protection class:	IP 65
. Life:	3 mill cycles



Wiring diagram



Panel Cut-out

Electrical Specifications

Potentiometers (Analog Tracks on base jstck)

. Electrical power rating:	0.25 W @ 25°C
. Ohmic resistance: / O & P Pot.Options	5 k ohm +/- 20%
/ S & T Pot. Options	3.75 k ohm +/- 20%
. Max. operating input voltage (Vin):	48 V or +/-24V
. Min. load impedance on pin 5 (Signal)	50 k ohm
. Max. operating current on pin 5	1 mA
. Output voltage / O & P Pot. Options	75% of Vin
/ S & T Pot. Options	100% of Vin
. Linearity	2% or better

Directional Switches on base joystick

. Typical track resistance:	150 Ohm
. Max. operating input voltage	48 V or +/-24V
. Min. load impedance on pins 2&3 :	50 k ohm
. Max. operating current on pins 2&3	1 mA
. Directional switches threshold angle:	+/- 4°
. Connector type:	3 =16 poles cable (Std)
	4= Deutsch HD14-9-16P
. Counter connector p/n:	Deutsch HD16-P-16S

Wiring Diagram: *refer to SM-JHD-L4C Service Manual*

Potentiometers & Switches Options

(Y-Y & X-X)	REFERENCE CODES	
Base prop. ctrls / Joystick	O/P=75%	S/T=100%
3-pins Pot	O	S
4-pins Pot & Bi-Dir Switch	P	T

Z-Z Axis (MG Grip)	REFERENCE CODES
ON-OFF Controls	
No push buttons	0000
Side DEAD MAN push button	A000
1-2-3….8 push buttons / P9 - 3 Amp	01P9 - 02P9 - …08P9
1-2-3…8 push buttons / AP - 200 mA	01AP -02AP -…08AP

K-K Axis (MG Grip)	REFERENCE CODES
Analog output (Hall effect sensor / 1-5 V output signal	
No FPR (Prop. roller)	0000
1 x FPR	1FPR
2 x FPR	2FPR
3 x FPR	3FPR

Ordering Information

JHD - L** / °° - MG / z z z z - k k k k - *

*** = 2S /4C /4D (main body configuration)*
°° = OO / PP / SS/ TT (type of 3/4-pins pots on main body)
z z z z = P9 / AP (push buttons on grip)
k k k k = 1FPR / 2FPR /3FPR (Prop. Rollers on Grip front)
** = 3 / 4 (Exit connector type)*

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

JHD-L4C/TT-MG/A1P9/2PRS-3

Mod. JHD-L4C/TT-MG/A1P9/2PRS - 3

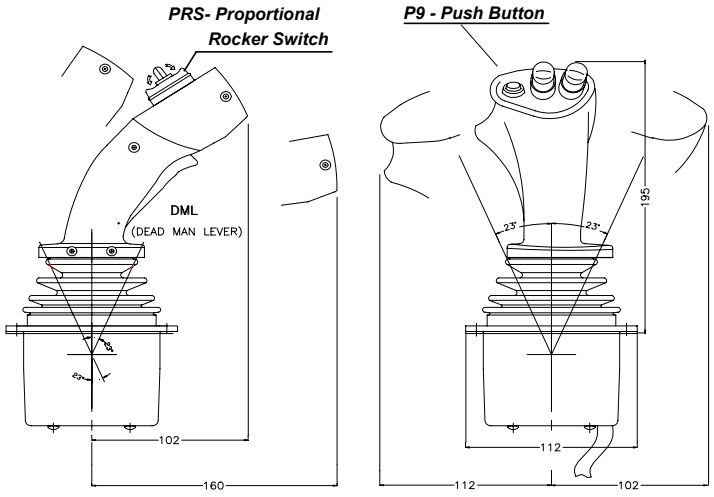
Heavy Duty / Multi-Axis Joystick Controller
with MG Multi-Function ergonomic grip and PRS Prop. Rocker Switches

Features

Mod. ***JHD-L4C*** joystick controller has been designed for use in Mobile Equipment applications in conjunction with TECNORD ***M M S*** electronic drivers to generate analogue and switched signals proportional to the lever deflection angle for the remote control of electro-hydraulic PROPORTIONAL or ON-OFF hydraulic valves of any type and Make. A center tap on the analog track provides an accurate voltage reference for the center position.

The ***M G*** range of ergonomic handles adopted for this line of joysticks controllers integrates the widest variety of ON-OFF push buttons and PROPORTIONAL rocker and roller switches. When coupled with a two - axis base joystick, up to 3-4-5 analog axes and 2 to 9 ON-OFF push buttons can be integrated in the same joystick package.

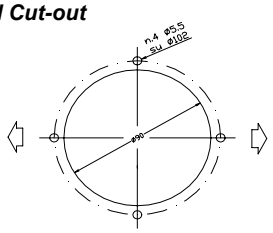
Overall dimensions



Mechanical Specifications

. Option ***L2S***	Single axis control / Bi-dir.
. Option ***L4C***	Cross axis control / Bi-dir.
. Option ***L4D***	Multi-axis control / Bi-dir.
. Operating temp. range:	-25°C / +80°C
. Protection class:	IP 65
. Life:	3 mill cycles

Panel Cut-out



Electrical Specifications

Potentiometers (Analog Tracks on base jstck & PRS)

. Electrical power rating:	0.25 W @ 25°C
. Ohmic resistance: / O & P Pot.Options	5 k ohm +/- 20%
/ S & T Pot. Options	2,5 k ohm +/- 20%
. Max. operating input voltage (Vin):	48 V or +/-24V
. Min. load impedance on pin 5 (Signal)	50 k ohm
. Max. operating current on pin 5	1 mA
. Output voltage / O & P Pot. Options	75% of Vin
/ S & T Pot. Options	100% of Vin
. Linearity	2% or better

Directional Switches on base joystick

. Typical track resistance:	150 Ohm
. Max. operating input voltage	48 V or +/-24V
. Min. load impedance on pins 2&3 :	50 k ohm
. Max. operating current on pins 2&3	1 mA
. Directional switches threshold angle:	+/- 4°

. Connector type:	3 =16 poles cable (Std)
	4= Deutsch HD14-9-16P

Wiring Diagram: *refer to SM-JHD-L4C-MG Service Manual*

Potentiometers & Switches Options

(Y-Y & X-X)	REFERENCE CODES	
Base prop. ctrls / Joystick	O/P=75%	S/T=100%
3-pin Pot & Bi-Dir Switch	O	S
4-pin Pot & Bi-Dir Switch	P	T

Z-Z Axis (MG Grip)	REFERENCE CODES
ON-OFF Controls	
No push buttons	0000
Side DEAD MAN push button	A000
1-2-3….8 push buttons / P9 - 3 Amp	01P9 - 02P9 - …08P9
1-2-3…8 push buttons / AP - 200 mA	01AP -02AP -…08AP

K-K Axis (MG Grip)	REFERENCE CODES
Analog Controls	
No PRS (Prop. Rocker Switch)	0000
1 x PRS	1PRS
2 x PRS	2PRS
3 x PRS	3PRS

*JHD - L** / °° - MG / z z z z - k k k k - **

*** = 2S /4C /4D (main body configuration)*
°° = OO / PP / SS/ TT (type of 3/4-pins pots on main body)
z z z z = P9 / AP (push buttons on grip)
k k k k = 1 PRS / 2 PRS /3 PRS (Prop. Rocker Switches on Grip front)
*** = 3 / 4 (Exit connector type)*

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MG-A8P9-0000

Mechanical Specifications:

. Material:	Thermoplastic
. Color:	Black
. Operating temperature range:	-25 °C / + 85°C
. Connecting hub:	Female thread / M14 x1.5

Electrical Specifications of push buttons

A - Dead man front lever:

. Rated amperage	3 Amp inductive

P9 - Push buttons

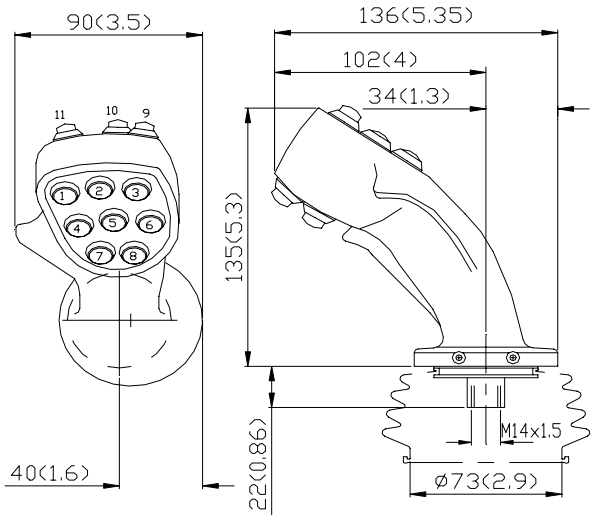
. No. of push buttons on front panel:		up to 8
. No. of push buttons on rear edge:		up to 3
. Rated amperage		3 Amp inductive
. Life:		> 100,000 cycles
. Available colors:	red	Blue
	yellow	black
	green	white

AP - Push buttons

. No. of push buttons on front panel:	up to 8
. No. of push buttons on rear edge:	up to 3
. Typical Amperage rating:	200 mA
. Life:	> 500,000 cycles

Pre-wired exit cable: 250 mm

Overall Dimensions



Mod. MG-A8P9-R3P9

** Rubber gather and retainer ring are supplied separately*

Mod. MG-A8P9-0000

Multi-function ergonomic handle with ON-OFF push buttons

- Optimum ergonomic design
- High performance switches
- Easy adaptability to existing joystick control levers

Ordering Information

	D-man P/B	*Front P/B*	*Rear P/B*
MG-0000-0000	0	0	0
MG-A000-0000	yes	0	0
MG-A1P9-0000:	yes	1xP9	0
MG-A2P9-0000:	yes	2xP9	0
MG-A8P9-0000:	yes	8xP9	0
MG-A8P9-R1P9	yes	8xP9	1xP9
MG-A8P9-R2P9	yes	8xP9	2xP9
MG-A8P9-R3P9	**yes**	**8xP9**	**3xP9**
MG-A1AP -0000	yes	1xAP	0
MG-A2AP-0000	yes	2xAP	0
MG-A8AP-R1AP	yes	8xAP	1xAP
MG-A8AP-R2AP	yes	8xAP	2xAP
MG-A8AP-R3AP	yes	8xAP	3xAP

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MG-A2P9-2PRS

Mechanical Specifications:

. Material:	Thermoplastic
. Plastic handle color	Black
. Operating temperature range:	-25 °C / + 85°C
. Connecting joint:	Female thread / M14 x1.5

Electrical Specifications of push buttons

A / Dead man front lever & P9 / Push buttons

. Rated amperage	3 Amp inductive
. Life:	> 100,000 cycles

AP - Push buttons

. Rated amperage	200 mA
. Life:	> 500,000 cycles

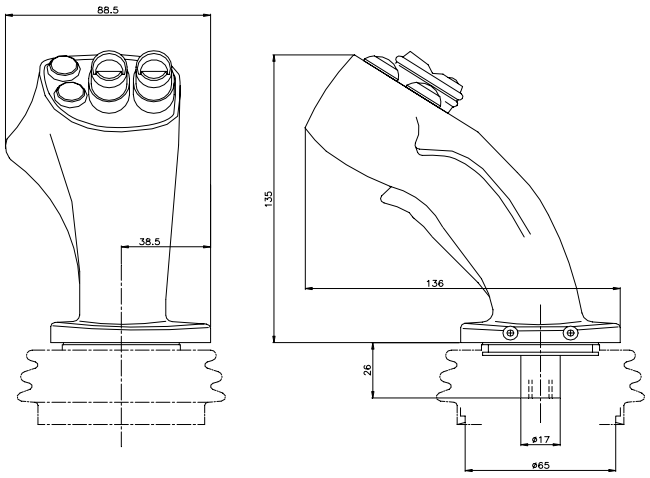
PRS Proportional Rocker Switch

. Configuration:	3-pins resistive pot
	4-pins / Center tap
	2 x Center /Power-off switched outputs

. Rotation angle:	+/- 24°
. Resistive track power rating:	0.5 Watt @ 25°C
. Resistive track Ohmic resistance:	5 k Ohm +/- 20%
. Linearity	2%
. Vin (max)	48V or +/- 24V
. Rated output current of potentiometer:	1 mA
. Rated current of switched outputs:	1 mA
. Min resistive load on bidirectional switched outputs:	50 k Ohm
. Operating temperature range:	-25 °C / + 85°C
. Environmental protection degree (above panel):	IP67
. Life:	>1.000.000 cycles

Pre-wired exit cable: 250 mm

Overall Dimensions



Mod. MG-A2P9-2PR

** Rubber gather and retainer ring are supplied separately*

Mod. MG-A2P9-2PRS

Multi-function ergonomic handle with ON-OFF push buttons and PRS Proportional Rocker Switches

- Optimum ergonomic design
- High performance switches
- Easy adaptability to existing joystick control levers

Ordering Information

	D-man P/B	Front P/B	Front PRS
MG-01P9-1PRS	0	1xP9	1
MG-A2P9-1PRS	yes	2xP9	1
MG-A3P9-1PRS	yes	3xP9	1
MG-A4P9-1PRS	yes	4xP9	1
MG-01P9-2PRS	0	1xP9	2
MG-A1P9-2PRS	yes	1xP9	2
MG-A2P9-2PRS	**yes**	**2xP9**	**2**
MG-0000-2PRS	0	0	2
MG-A000-2PRS	yes	0	2
MG-A000-3PRS	yes	0	3
MG-01AP-1PRS	0	1xAP	1
MG-A2AP-1PRS	yes	2xAP	1
MG-A3AP-1PRS	yes	3xAP	1
MG-A4AP-1PRS	yes	4xAP	1
MG-01AP-2PRS	0	1xAP	2
MG-A1AP-2PRS	yes	1xAP	2
MG-A2AP-2PRS	yes	2xAP	2

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

MG-A2P9-2FPR

Mechanical Specifications:

. Material:	Thermoplastic
. Plastic handle color	Black
. Operating temperature range:	-25°C / + 85° C
. Connecting joint:	Female thread / M14 x1.5

Electrical Specifications of push buttons

A - Dead man front lever:

. Rated amperage	3 Amp inductive
. Life:	> 100,000 cycles

P9 - Push buttons

. Rated amperage	3 Amp inductive
. Life:	> 100,000 cycles

AP - Push buttons

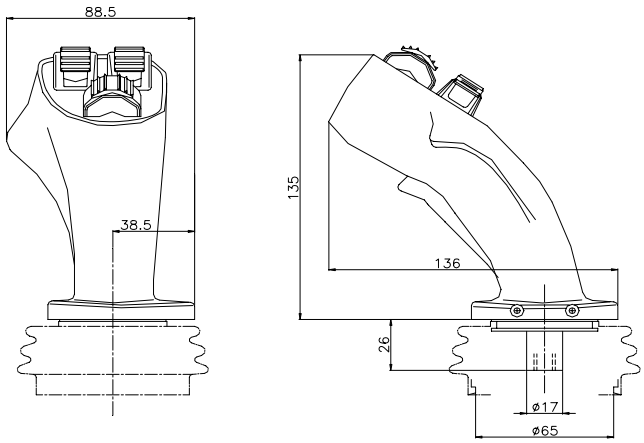
. Rated amperage	200 mA
. Life:	> 500,000 cycles

FPR Proportional Roller

. Configuration:	3-pins connection / Hall Effect contactless sensor
. Rotation angle	+/- 23°
. Supply voltage:	8-32 Vdc
. Current consumption at rest:	25 mA
. Signal output @ rest:	2.5 Vdc +/-0.0V
. Full output signal range:	0.5 - 4.5 V, +/-0.2V
. Rated output current:	1 mA
. Operating temperature range:	-25 °C / + 85°C
. Environmental protection degree (above panel):	IP67
. Life:	>5.000.000 cycles

Pre-wired exit cable: 250 mm

Overall Dimensions



Mod. MG-A000-3FPR

** Rubber gather and retainer ring are supplied separately*

Mod. MG-A2P9-2FPR

Multi-function ergonomic handle with ON-OFF push buttons and FPR Proportional Rollers

- Optimum ergonomic design
- High performance switches
- Easy adaptability to existing joystick control levers

Ordering Information

	D-man P/B	*Front P/B*	*Front FPR*
MG-01P9-1FPR	0	1xP9	1
MG-A2P9-1FPR	yes	2xP9	1
MG-A3P9-1FPR	yes	3xP9	1
MG-A4P9-1FPR	yes	4xP9	1
MG-01P9-2FPR	0	1xP9	2
MG-A1P9-2FPR	yes	1xP9	2
MG-A2P9-2FPR	**yes**	**2xP9**	**2**
MG-0000-2FPR	0	0	2
MG-A000-2FPR	yes	0	2
MG-A000-3FPR	**yes**	**0**	**3**
MG-01AP-1FPR	0	1xAP	1
MG-A2AP-1FPR	yes	2xAP	1
MG-A3AP-1FPR	yes	3xAP	1
MG-A4AP-1FPR	yes	4xAP	1
MG-01AP-2FPR	0	1xAP	2
MG-A1AP-2FPR	yes	1xAP	2
MG-A2AP-2FPR	yes	2xAP	2

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

MG-A4P9-1FPR-1PWM

Mechanical Specifications:

. Material:	Thermoplastic
. Plastic handle color	Black
. Operating temperature range:	-25°C / + 85° C
. Connecting joint:	Female thread / M14 x1.5

Electrical Specifications of push buttons

A/ Dead man front lever & P9/ Push Buttons

. Rated amperage	3 Amp inductive
. Life:	> 100,000 cycles

FPR Proportional Roller

. Configuration:	3-pins connection / Hall Effect contactless sensor
. Rotation angle	+/- 23°
. Supply voltage:	8-32 Vdc
. Current consumption at rest:	25 mA
. Signal output @ rest:	2.5 Vdc +/-0.0V
. Full output signal range:	0.5 - 4.5 V, +/-0.2V
. Rated output current:	1 mA
. Operating temperature range:	-25 °C / + 85°C
. Environmental protection degree (above panel):	IP67
. Life:	>5.000.000 cycles

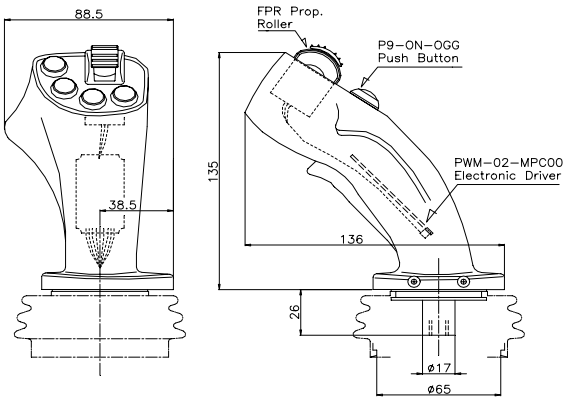
PWM - Pulse Width Modulated output current driver

. Supply voltage:	8 - 32 Volt
. Max. current draw:	100 mA
. Current output range:	Factory set btw 0 and 1400 mA
. PWM dither frequency:	100 Hz
. Operating temperature range:	-25°C/+85°C

Pre-wired exit cable:

. Standard length	250 mm
. Wiring diagram:	Refer to MG-1FPR - PWM Service Manual

Overall Dimensions



Mod. MG-A4P9-1FPR-1PWM

** Rubber gather and retainer ring are supplied separately*

Mod. MG-A4P9-1FPR-1PWM

Multi-function ergonomic handle with ON-OFF push buttons, 1 x FPR Proportional Rollers and built-in PWM driver for a bidirectional / dual proportional coil

- Optimum ergonomic design
- High performance switches
- Easy adaptability to existing joystick control levers

Ordering Information

	D-man P/B	Front P/B	FPR	PWM
MG-01P9-1FPR-1PWM	0	1xP9	1	1
MG-A2P9-1FPR-1PWM	yes	2xP9	1	1
MG-A3P9-1FPR-1PWM	yes	3xP9	1	1
MG-A4P9-1FPR-1PWM	**yes**	**4xP9**	**1**	**1**
MG-01AP-1FPR-1PWM	0	1xAP	1	1
MG-A2AP-1FPR-1PWM	yes	2xAP	1	1
MG-A3AP-1FPR-1PWM	yes	3xAP	1	1
MG-A4AP-1FPR-1PWM	yes	4xAP	1	1

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PRS-L2S-S0-0-0

Mechanical Specifications:

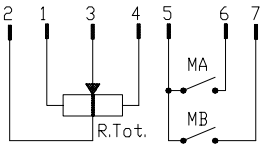
. Main body material:	Acetyl resin / Teflon compound
. Rubber gather material	EPDM / 35-45 shore - A
. Rubber gather color	Black
. Operating temperature range:	-25°C / + 85° C
. Environmental protection	IP 66 (above panel)
. Life:	>1.000.000 cycles

Electrical Specifications

. Configuration:	3-pins resistive pot. w/o directional switches 4-pins resistive pot. w/ bidirectional switches

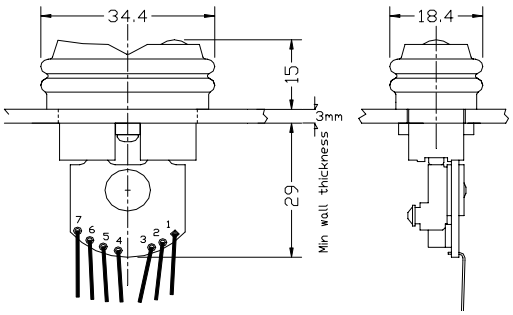
. Mechanical rotation angle	+/- 24°
. Resistive track power rating:	0.5 Watt @ 25°C
. Resistive track Ohmic resistance:	5 k Ohm +/- 20%
. Linearity	2%
. Vin (max)	48V or +/- 24V
. Rated output current of potentiometer:	1 mA
. Rated current of switched outputs:	1 mA
. Min resistive load on bidirectional switched outputs:	50 k Ohm
. Operating temperature range:	-25 °C / + 85°C
. Pre-wired exit cable:	250 mm

Electrical Schematic

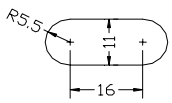


P & T version
4-pins type

Overall Dimensions



Panel cut - out



Ordering Information

Mod. MG - L2S - ° ° - *

° ° = O / S (75%/ 100% 3-pins pot.) - P / T (75% / 100% 4 pin pots)
Q / R (80% / 100% 3 & 4 pins)

* = 0 / L (with or without mini-paddle)

Mod. PRS - L2S - S0 - 0 - 0

Mini Proportional Rocker Switch with built-in bidirectional switched outputs

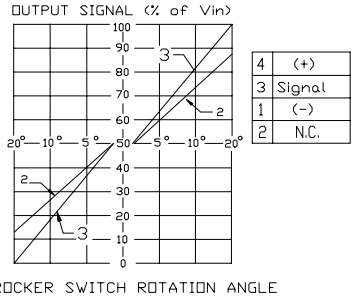
- Optimum ergonomic design for panel-mounting on remote control boxes and for the retrofitting of joystick handles

- High performance resistive tracks

Ordering Information

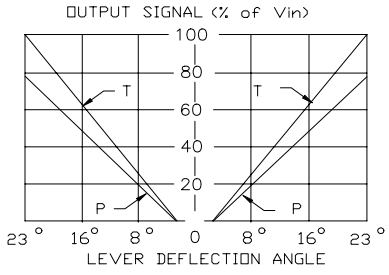
3 - PINS / STD CONFIGURATION

PRS - L2S - O0	3-pins pot - 75% of Vin / Bidir. switches
PRS - L2S - S0	3-pins pot - 100% of Vin / Bidir. switches



4-PINS / CENTER TAP CONFIGURATION

PRS - L2S - P0	4-pins pot - 75% of Vin / Bidir. switches
PRS - L2S - T0	4-pins pot - 100% of Vin / Bidir. switches



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PRS-L2S-SNCH

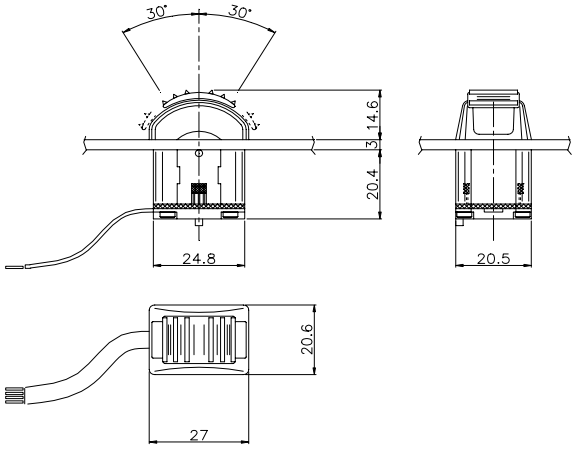
Mechanical Specifications:

. Main body material:	Acetal resin & Teflon compound
. Main body colour:	Yellow
. Rubber gaither material	EPDM / 35-45 shore - A
. Operating temperature range:	-25°C / + 85° C
. Environmental protection	IP 68
. Life:	>5.000.000 cycles

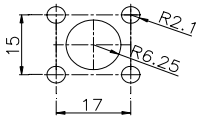
Electrical Specifications

. Configuration:	3-pins connection / Hall Effect contactless sensor	
. Rotation angle		+/- 30°
. Supply voltage:		8-32 Vdc
. Current consumption at rest:	SNCH (S1 only)	15 mA
	TWCH (S1/S2 9	25 mA
. Signal output @ rest:		2.5 Vdc +/-0.1V
. Full output signal range:		0.5 - 4.5 V, +/-0.2V
. Rated output current:		1 mA
. Operating temperature range:		-25 °C / + 85°C
. Environmental protection degree (above panel):		IP67
. Life:		>5.000.000 cycles

Overall Dimensions



Panel cut-out



Electrical Connections:

FPR - L2S - SNCH- 0
(Single channell)

Yellow:	+ 5Vdc
Orange:	(-) Ground
Red:	S1
Brown:	not used

FPR - L2S - TWCH - 0
(Twin channell)

Yellow:	+ 5Vdc
Orange:	(-) Ground
Red:	S1
Brown:	S2

Mod. FPR - L2S - SNCH

- Mini Proportional Roller Switch with built-in bidirectional switched outputs

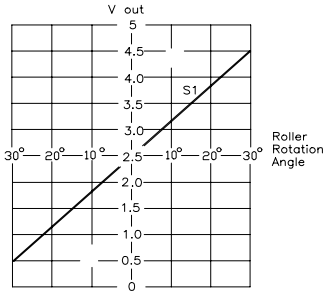
- Optimum ergonomic design for panel-mounting on remote control boxes and for the retrofitting of joystick handles

- High performance Hall Effect Sensor Circuitry

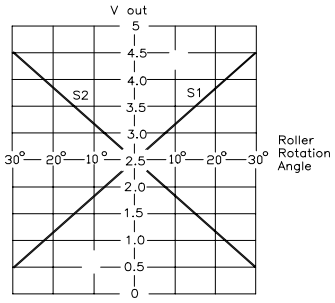
- Single Channell and Twin Channell configurations

Control Characteristic

FPR - L2S - SNCH - 0 (Single Channell)



FPR - L2S - TWCH - 0 (Twin Channell)



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New Releases

New Pages	Mnemonic	Description	Date Released
5N-6N	HA-S2P	High Pressure “Mini” Series 2 Way, Normally Closed Poppet Valve	Oct 2007
7N-8N	HE-S2B	High Pressure “Delta” Series 2 Way, Normally Closed Poppet Valve	Oct 2007
9N-10N	HE-RWP	Rapid Response “Delta” series Pilot Operated Relief Valve	Oct 2007
11N-12N	DG-PTC	“Delta” series Normally Open Sequence Valve with External Pilot	Oct 2007
13N-14N	DG-PTO	“Delta” series Normally Closed Sequence Valve with External Pilot	Oct 2007
15N-16N	DE-S2K	“Delta” series Normally Open, Bi-directional	Mar 2008
17N-18N	EP-PRU	“Power” series Solenoid Operated, 3W2P proportional pressure reducing/relieving valve.	

Coming Soon

New Pages	Mnemonic	Description
19CS-20CS	VQ-S4M	Low Profile “Power” Series, solenoid operated 4W3P, motor spool valve.
21CS-22CS	VQ-S4Q	Low Profile “Power” Series, solenoid operated 4W3P, closed center spool valve.
23CS-24CS	VQ-S4R	Low Profile “Power” Series, solenoid operated 4W3P, tandem center spool valve.
25CS-26CS	VE-RWA	Ultra High Pressure “Delta” Series, direct acting relief valve.
27CS-28CS	VA-RCT	Ultra High Pressure “Mini” Series, direct acting thermal relief valve.
29CS-30CS	MD-CDP	“Mini” Series, double pilot operated check valve.
31CS-32CS	PQ-CDP	“Power” Series, double pilot operated check valve.
33CS-34CS	DG-CDP	“Delta” Series, double pilot operated check valve.
35CS-36CS	IP-DAR	Special Series, flange retained, slip-in proportional pressure reducing relieving valve.
37CS	Override Option	Rotary bi-directional manual override option
39CS-40CS	MA-S2F	“Ultra Low”, 2 Drops/Hour “Mini” Series P.O. 2 Way N. C. Soft Seat
41CS-42CS	PB-S2F	“Ultra Low”, 2 Drops/Hour “Power” Series P.O. 2 Way N. C. Soft Seat
43CS-44CS	MA-CVS	“Ultra Low”, 2 Drops/Hour “Mini” Series Dir. Act. Check Vlv. Soft Seat
45CS-46CS	PB-CVS	“Ultra Low”, 2 Drops/Hour “Power” Series Dir. Act. Check Vlv. Soft Seat

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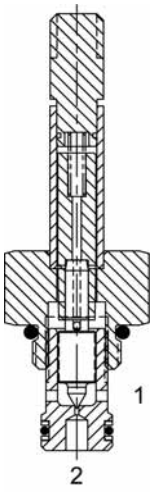
HA-S2P Poppet, 2 Way, Normally Closed



DESCRIPTION

"High Pressure" 7 size, 5/8-18 thread, "Mini" series, solenoid operated, 2 way normally closed, poppet valve.

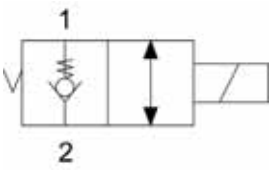
OPERATION

When de-energized the HA-S2P blocks flow from (1) to (2). When energized the valve allows flow from (1) to (2).

FEATURES

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

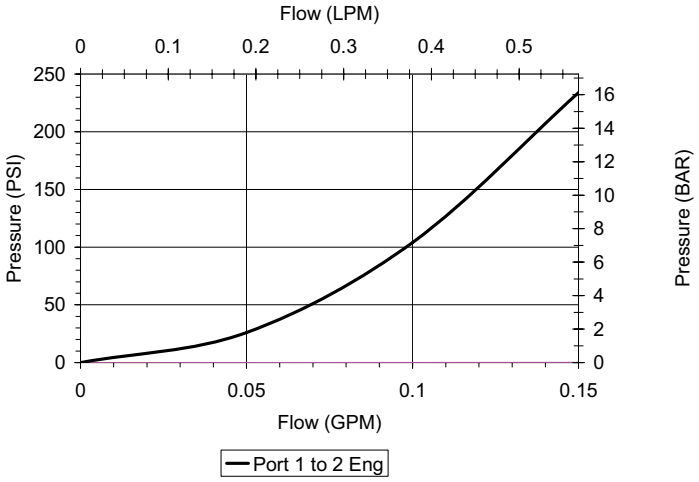
HYDRAULIC SYMBOL



Great for pilot control, low leakage.
Flow from port (2) to port (1) will happen once pressure is between 1000 and 2000 PSI

PERFORMANCE

Actual Test Data (Cartridge Only)



VALVE SPECIFICATIONS

Nominal Flow	.10 GPM (.38 LPM)
Rated Operating Pressure	5000 PSI (350 bar)
Typical Internal Leakage (150 SSU)	0-10 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	-40° to 250° F (-40° to 120° C)
Weight	.18 lbs. (.08 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	15 ft-lbs (20.3 Nm)
Coil Nut Torque Requirements	3-5 ft-lbs (4.1-6.8 Nm)
Cavity	SPECIAL
Cavity Form Tool (Finishing)	40500058
Seal Kit	21191000

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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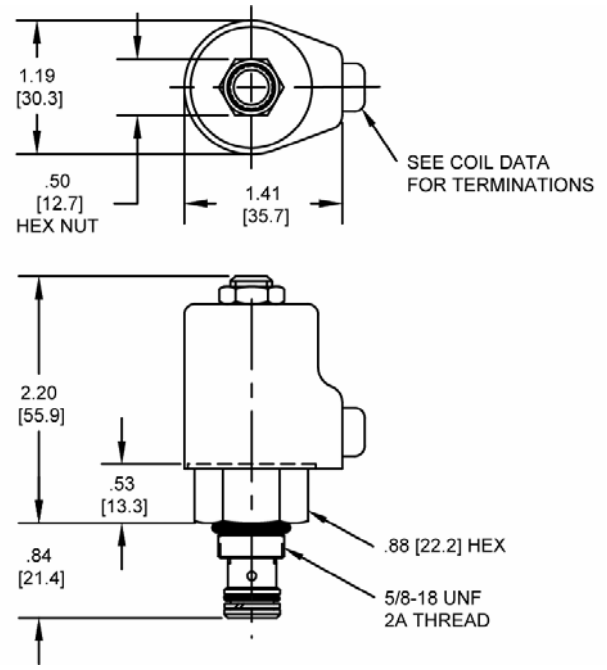
DIMENSIONS



HA-S2P - ____ - ____ - ____ - ____

OPTIONS

Buna Standard	**00**
Viton Standard	**V0**

BODIES

Blank	Without Body
S	#4 SAE Ports

WARNING
DO NOT USE ALUMINUM
HIGH PRESSURE (5000 PSI) PRODUCT

"M" COIL TERMINATION
(All DC Except as Noted)

Double Lead	**DL**
Deutsch on Leads DT04-2P	**DT**
Metri-Pack on Leads	**ML**
Packard on Leads	**PL**
Weatherpack on Leads	**WL**
Single Spade	**SS**
Double Spade	**DS**
DIN 43650 (Hirschmann) – *(AC&DC)*	**HC**
Conduit Lead – *(AC only)*	**CL**

VOLTAGE

06	6 VDC
12	12 VDC
24	24 VDC
36	36 VDC
48	48 VDC
25	24 VAC
11	120 VAC
22	220 VAC
44	440 VAC

Approximate Coil Weight: .30 lbs/.14 kg.

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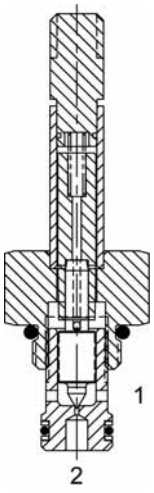
Joymatic, S.A. de C.V. Av. Cuitláhuac # [illegible] Col. La Navaría, Del. Azcapotzalco. México D.F.
ventas@joymatic.com.mx - Tel. (+52) 55 5396 0732 - www.joymatic.com.mx
Joymatic

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

HA-S2P Poppet, 2 Way, Normally Closed



DESCRIPTION

"High Pressure" 7 size, 5/8-18 thread, "Mini" series, solenoid operated, 2 way normally closed, poppet valve.

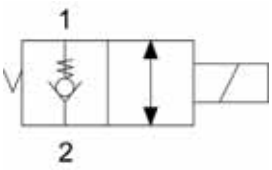
OPERATION

When de-energized the HA-S2P blocks flow from (1) to (2). When energized the valve allows flow from (1) to (2).

FEATURES

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

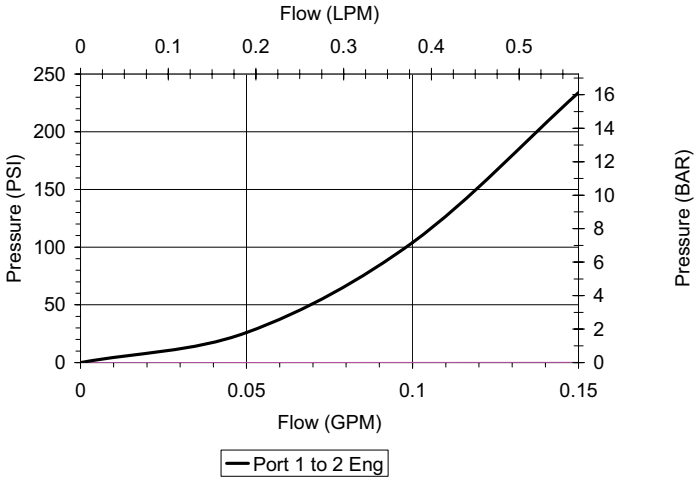
HYDRAULIC SYMBOL



Great for pilot control, low leakage.
Flow from port (2) to port (1) will happen once pressure is between 1000 and 2000 PSI

PERFORMANCE

Actual Test Data (Cartridge Only)



VALVE SPECIFICATIONS

Nominal Flow	.10 GPM (.38 LPM)
Rated Operating Pressure	5000 PSI (350 bar)
Typical Internal Leakage (150 SSU)	0-10 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	-40° to 250° F (-40° to 120° C)
Weight	.18 lbs. (.08 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	15 ft-lbs (20.3 Nm)
Coil Nut Torque Requirements	3-5 ft-lbs (4.1-6.8 Nm)
Cavity	SPECIAL
Cavity Form Tool (Finishing)	40500058
Seal Kit	21191000

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Joymatic, S.A. de C.V. Av. Cuitláhuac #3685 Col. Clavería, Del. Azcapotzalco. México D.F.
ventas@joymatic.com.mx - Tel. (+52) 55 5396 0732 - www.joymatic.com.mx
Joymatic

Joymatic, S.A. de C.V. Av. Cuitláhuac #3685 Col. Clavería, Del. Azcapotzalco. México D.F.
ventas@joymatic.com.mx - Tel. (+52) 55 5396 0732 - www.joymatic.com.mx

PRS-L2S-SNCH

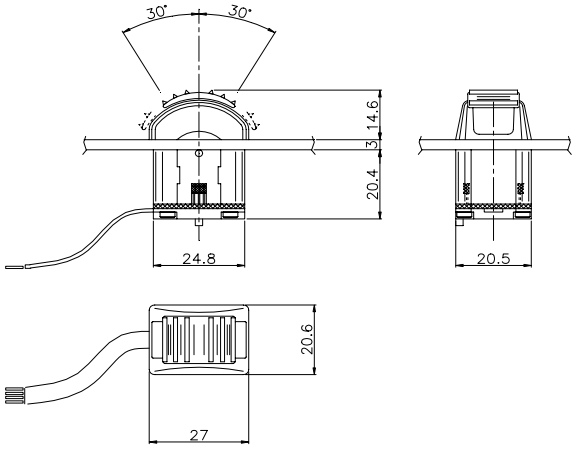
Mechanical Specifications:

. Main body material:	Acetal resin & Teflon compound
. Main body colour:	Yellow
. Rubber gaither material	EPDM / 35-45 shore - A
. Operating temperature range:	-25°C / + 85° C
. Environmental protection	IP 68
. Life:	>5.000.000 cycles

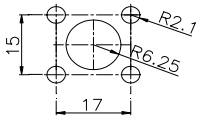
Electrical Specifications

. Configuration:	3-pins connection / Hall Effect contactless sensor	
. Rotation angle		+/- 30°
. Supply voltage:		8-32 Vdc
. Current consumption at rest:	SNCH (S1 only)	15 mA
	TWCH (S1/S2 9	25 mA
. Signal output @ rest:		2.5 Vdc +/-0.1V
. Full output signal range:		0.5 - 4.5 V, +/-0.2V
. Rated output current:		1 mA
. Operating temperature range:		-25 °C / + 85°C
. Environmental protection degree (above panel):		IP67
. Life:		>5.000.000 cycles

Overall Dimensions



Panel cut-out



Electrical Connections:

FPR - L2S - SNCH- 0
(Single channell)

Yellow:	+ 5Vdc
Orange:	(-) Ground
Red:	S1
Brown:	not used

FPR - L2S - TWCH - 0
(Twin channell)

Yellow:	+ 5Vdc
Orange:	(-) Ground
Red:	S1
Brown:	S2

Mod. FPR - L2S - SNCH

- Mini Proportional Roller Switch with built-in bidirectional switched outputs

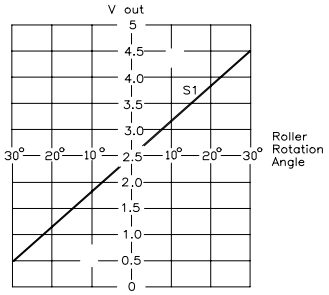
- Optimum ergonomic design for panel-mounting on remote control boxes and for the retrofitting of joystick handles

- High performance Hall Effect Sensor Circuitry

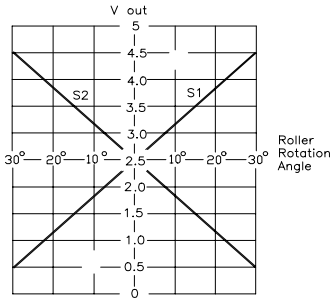
- Single Channell and Twin Channell configurations

Control Characteristic

FPR - L2S - SNCH - 0 (Single Channell)



FPR - L2S - TWCH - 0 (Twin Channell)



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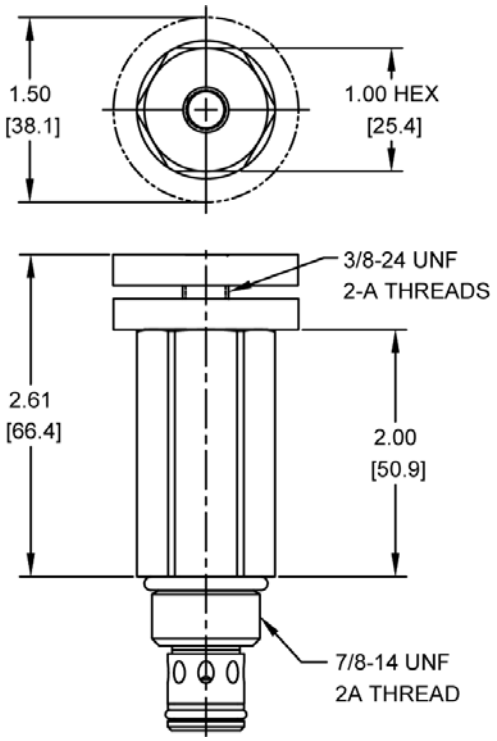
DIMENSIONS



ORDERING INFORMATION

HE-RWP - _____ - _____ - _____

OPTIONS

Buna Standard	**00**
Viton Standard	**V0**
Buna, Knob	**0K**
Viton, Knob	**VK**
Internally Adj. Buna	**0I**
Internally Adj. Viton	**VI**
Tamper Proof Buna	**0T**
Tamper Proof Viton	**VT**

5000

BODIES
Consult Factory

WARNING
DO NOT USE ALUMINUM BODY
HIGH PRESSURE (5000 PSI) PRODUCT

PRESSURE RANGE/SETTING
1000 – 5000 PSI

Tamper Proof
Fill in 4 Digit Pressure Setting
Example: 1500 – 1500 PSI

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Joymatic, S.A. de C.V. Av. Cuitláhuac # 1606 Col. Clavería, Del. Azcapotzalco. México D.F.
ventas@joymatic.com.mx - Tel. (+52) 55 5396 0732 - www.joymatic.com.mx
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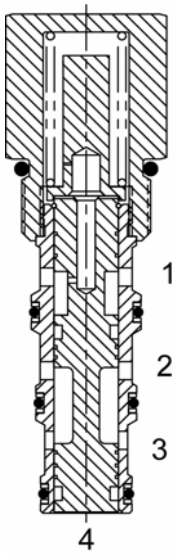
4484 Boeing Drive - Rockford, IL 61109

DG-PTC Sequence Valve, Normally Open, External Pilot



DESCRIPTION

10 size, 7/8-14 thread, “Delta” series, external pilot, normally open.

OPERATION

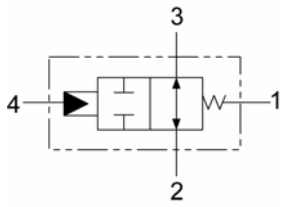
The DG-PTC allows flow at ports (3) and (2). On attainment of a predetermined pressure at port (4), the valve shifts to block flow from port (3) to (2).

Spring Chamber is constantly vented to port (1).

FEATURES

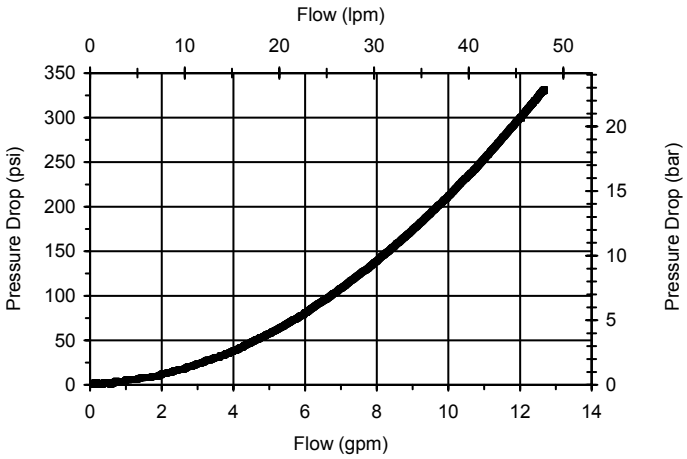
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL



PERFORMANCE

Actual Test Data (Cartridge Only)



VALVE SPECIFICATIONS

Nominal Flow	10 GPM (38 LTR/M)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	5 cu in/min (82 ml/min)
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	-40° to 250° F (-40° to 120° C)
Weight	.39 lbs. (.18 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 4W
Cavity Form Tool (Finishing)	40500002
Seal Kit	21191108

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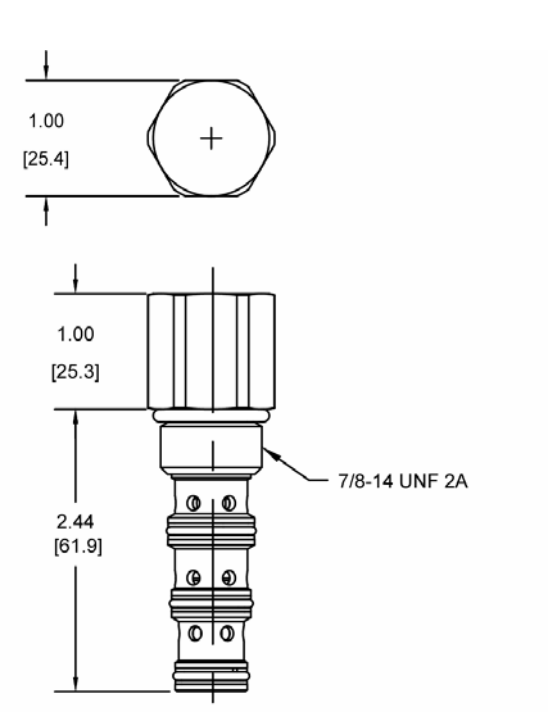
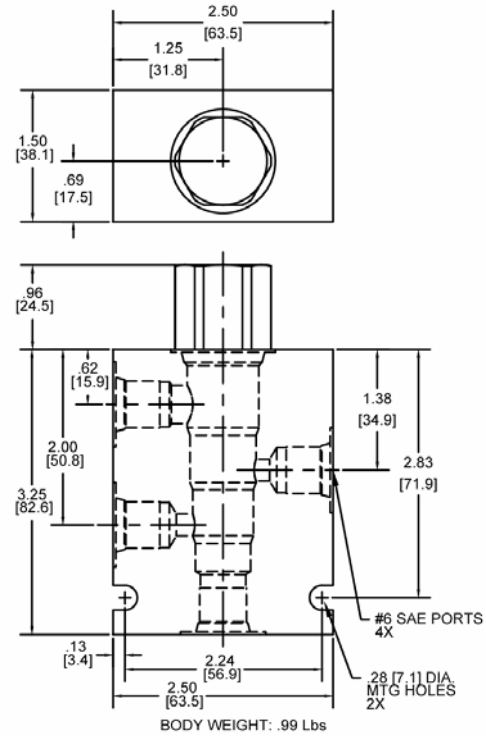
DIMENSIONS





ORDERING INFORMATION

DG-PTC - ____ - ____ - ____

OPTIONS

Buna Standard	**00**
Viton Standard	**V0**

SPRING BIAS

0050	50 PSI
0180	180 PSI

☛10%

BODIES

Blank	Without Body
N	1/4" NPTF PORT
S	#6 SAE Ports

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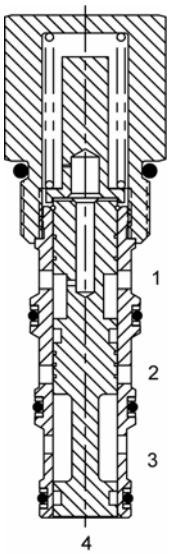
DG-PTO Sequence Valve, Normally Closed, External Pilot



DESCRIPTION

10 size, 7/8-14 thread, “Delta” series, external pilot, normally closed.

OPERATION

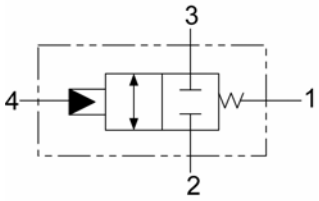
The DG-PTO blocks flow at ports (3) and (2). On attainment of a predetermined pressure at port (4), the valve shifts to allow flow from port (3) to (2).

Spring Chamber is constantly vented to port (1).

FEATURES

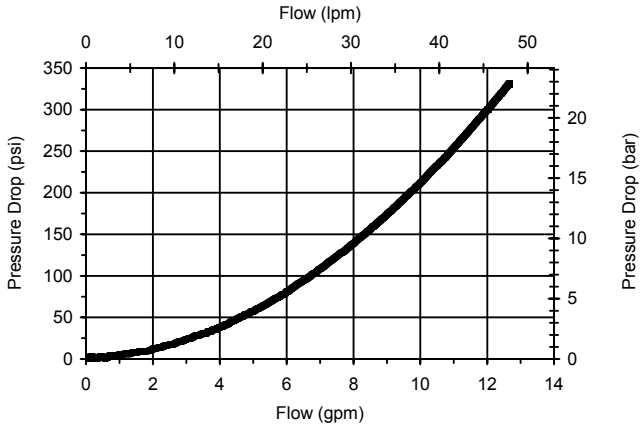
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL



PERFORMANCE

Actual Test Data (Cartridge Only)



VALVE SPECIFICATIONS

Nominal Flow	10 GPM (38 LTR/M)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	5 cu in/min (82 ml/min)
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	-40° to 250° F (-40° to 120° C)
Weight	.39 lbs. (.18 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 4W
Cavity Form Tool (Finishing)	40500002
Seal Kit	21191108

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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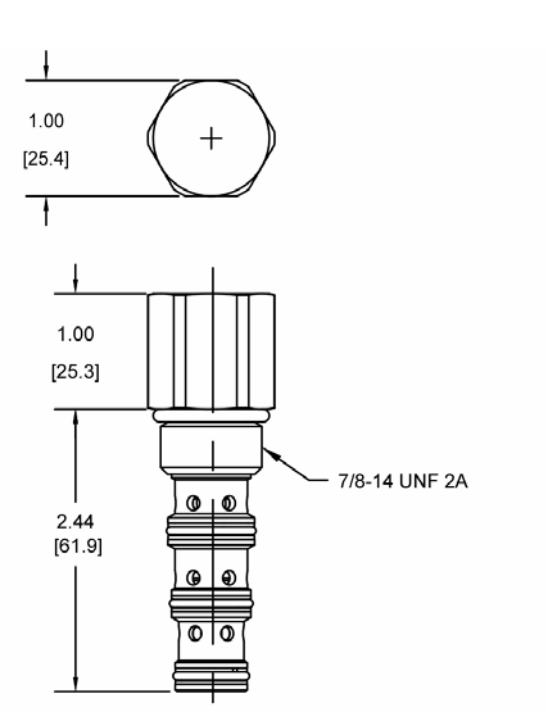
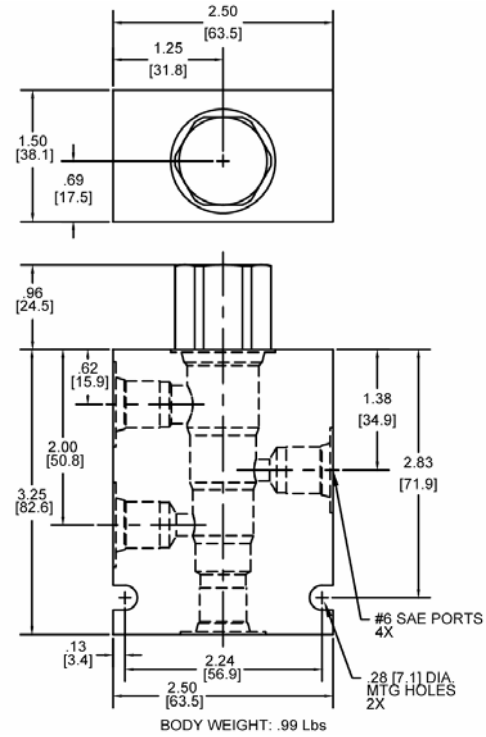
DIMENSIONS





ORDERING INFORMATION

DG-PTO - ____ - ____ - ____

OPTIONS

Buna Standard	**00**
Viton Standard	**V0**

SPRING BIAS

0050	50 PSI
0180	180 PSI

☛10%

BODIES

Blank	Without Body
N	1/4" NPTF PORT
S	#6 SAE Ports

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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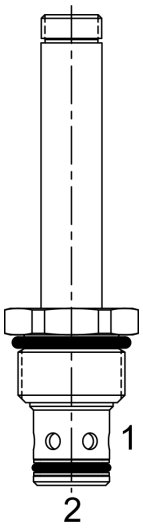
DE-S2K Pilot Operated Poppet, 2 Way, Normally Open, Bi-directional



DESCRIPTION

10 Size, 7/8-14 thread, “Delta” series, solenoid operated, 2 way normally open, bi-directional poppet

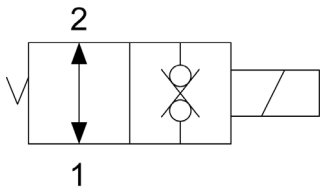
OPERATION

When de-energized, the DE-S2K allows flow from (1) to (2) and from (2) to (1). When energized, the valve blocks flow from (1) to (2) and from (2) to (1).

FEATURES

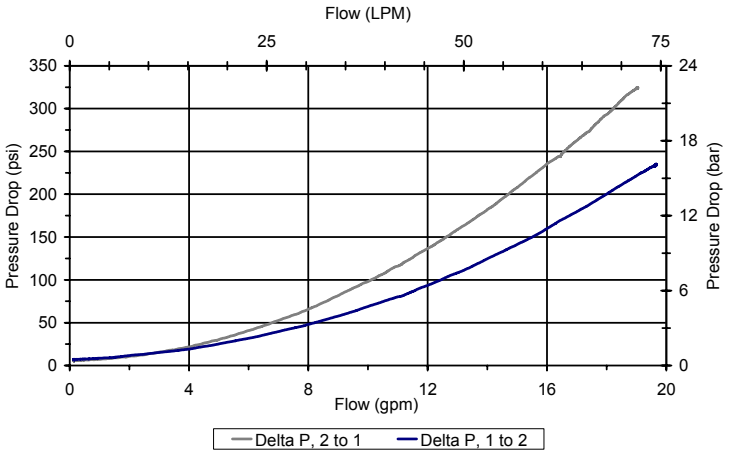
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.
- Optional “I” Coil: Weatherproof, Thermal Shock, Immersion Safe.

HYDRAULIC SYMBOL



PERFORMANCE

Actual Test Data (Cartridge Only)



VALVE SPECIFICATIONS

Nominal Flow	12 GPM (45 LPM)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	0-10 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	-40° to 250° F (-40° to 120° C)
Weight	.29 lbs. (.13 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Coil Nut Torque Requirements	4-6 ft-lbs (5.4-8.1 Nm)
Cavity	DELTA 2W
Cavity Form Tool (Finishing)	40500000
Seal Kit	21191202

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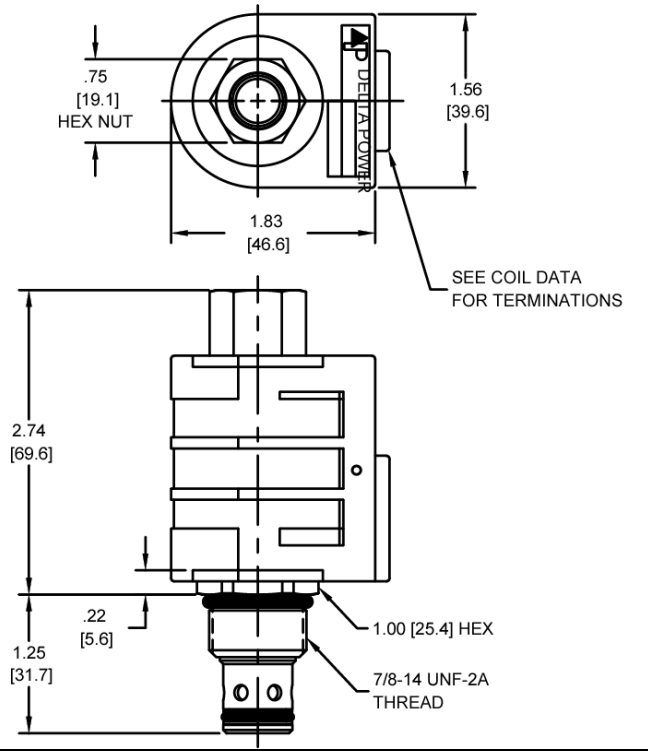
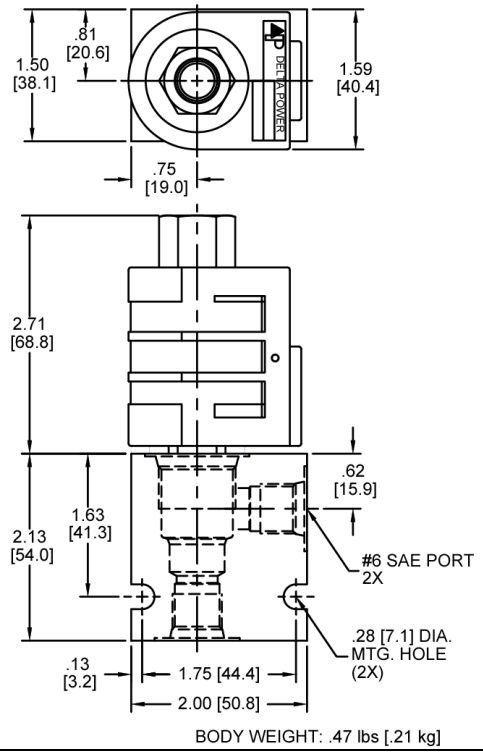
DIMENSIONS





ORDERING INFORMATION

DE-S2K - ____ - ____ - ____ - ____

OPTIONS

Buna Standard	**00**
Viton Standard	**V0**
Buna, Screen	**A0**
Viton, Screen	**W0**

BODIES

Blank	Without Body
N	3/8 NPTF Ports
S	#8 SAE Ports

VOLTAGE

06	6 VDC
12	12 VDC
24	24 VDC
36	36 VDC
48	48 VDC
25	24 VAC
11	120 VAC
22	220 VAC
44	440 VAC

Note: Use screen only if flow direction is from (1) to (2).

"D" COIL TERMINATION
(All DC Except as Noted)

DL	Double Lead
DT	Deutsch on Leads DT04-2P
ML	Metri-Pack on Leads
PL	Packard on Leads
WL	Weatherpack on Leads
SS	Single Spade
DS	Double Spade
HC	DIN 43650 (Hirschman) – *(AC & DC)*
CL	Conduit Lead – *(AC Only)*
DI	Deutsch – Integral DT04-2P

IMMERSION PROOF "D" TYPE

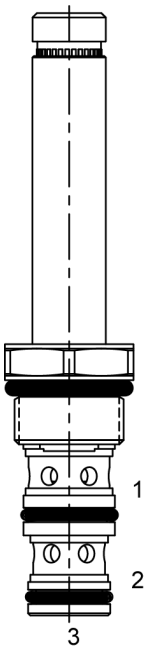
IA	"I" Coil AMP Superseal - Integral
ID	"I" Coil Deutsch – Integral DT04-2P
IJ	"I" Coil AMP Jr. Timer - Integral
IM	"I" Coil Metri-Pack – Integral

Approximate Coil Weight: .72 lbs. (.32 kg.)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

EP-PRU 3 Way 2 Position, Proportional Pressure Reducing/Relieving Valve



DESCRIPTION

8 size, 3/4-16 thread, “Power” series, solenoid operated, 3 way 2 position, proportional pressure reducing/relieving valve.

OPERATION

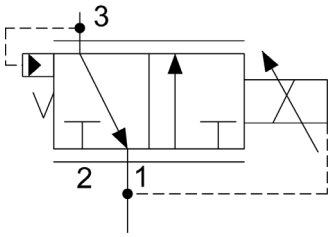
When de-energized the EP-PRU blocks flow at (2) and allows flow from (1) to (3).

When energized, the actuator creates a force proportional to the pressure that will be regulated at port (3). Oil is supplied from port (2) to (3) until desired pressure is reached. If pressure at port (3) exceeds desired level, excess oil is vented to port (1) until desired level is reached.

FEATURES

- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.
- Optional “I” Coil: Weatherproof, Thermal Shock, Immersion Safe.

HYDRAULIC SYMBOL

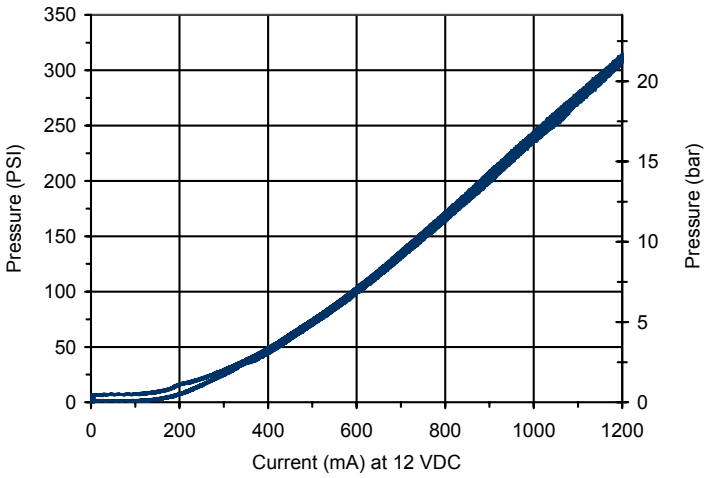


If low voltage is expected on the machine, 12 or 24 volt systems will require the use of 10 volt or 20 volt coils respectively. Consult Factory for availability of these coil options.

Consult Factory for electrical signal recommendations.

PERFORMANCE

Actual Test Data (Cartridge Only)



VALVE SPECIFICATIONS

Nominal Flow	3 GPM (11.4 LPM)
Max Operating Pressure	500 PSI (34.5 bar)
Max Differential Pressure	300 PSI (20.7 bar)
Typical Hysteresis	5%
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	-40° to 250° F (-40° to 120° C)
Weight	.24 lbs. (.11 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	25 ft-lbs (34 Nm)
Coil Nut Torque Requirements	4-6 ft-lbs (5.4-8.1 Nm)
Cavity	POWER 3W
Cavity Form Tool (Finishing)	40500024
Seal Kit	21191110

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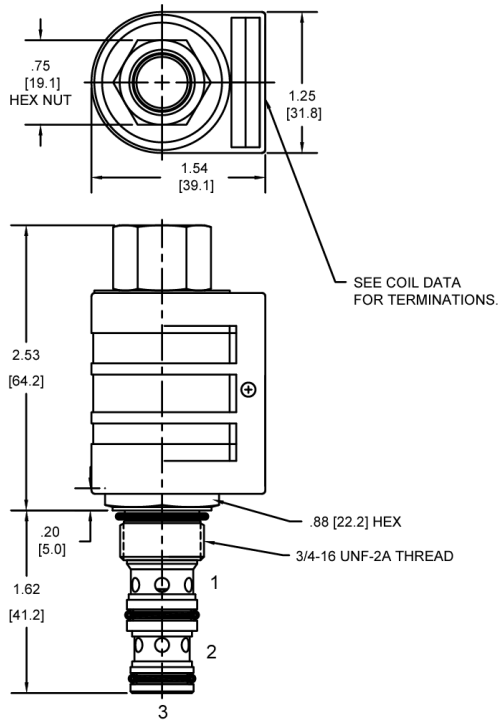
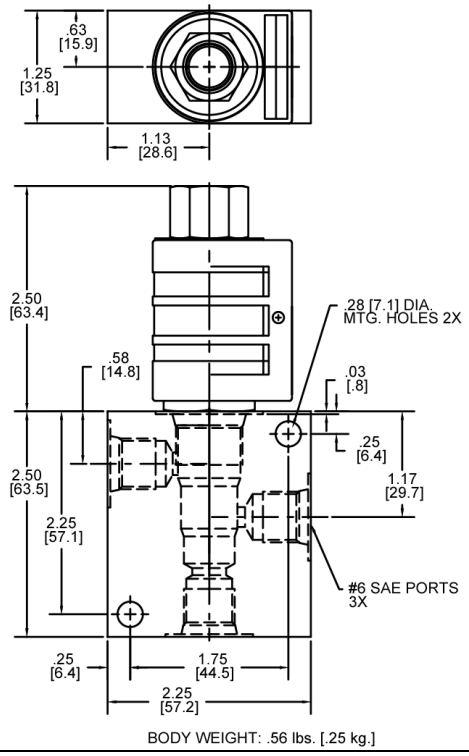
DIMENSIONS





BODY WEIGHT: .56 lbs. [.25 kg.]

ORDERING INFORMATION

EP-PRU - ____ - ____ - ____ - ____

OPTIONS

Buna Standard	**00**
Viton Standard	**V0**

BODIES

Blank	Without Body
N	1/4 NPTF Ports
S	#6 SAE Ports

VOLTAGE

06	6 VDC
12	12 VDC
24	24 VDC
36	36 VDC
48	48 VDC

"P" COIL TERMINATION

DL	Double Lead
DT	Deutsch on Leads DT04-2P
ML	Metri-Pack on Leads
PL	Packard on Leads
WL	Weatherpack on Leads
SS	Single Spade
DS	Double Spade
HC	DIN 43650 (Hirschman) – *(DC)*
DI	Deutsch – Integral DT04-2P

IMMERSION PROOF "P" COILS

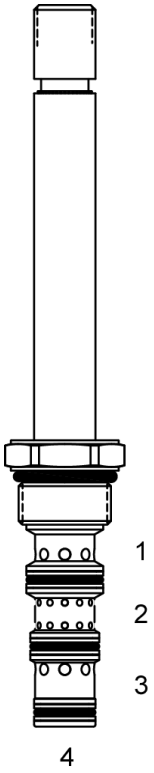
IA	"I" Coil AMP Superseal Integral
ID	"I" Coil Deutsch Integral DT04-2P
IJ	"I" Coil AMP Jr. Timer - Integral
IM	"I" Coil Metri-Pack Integral

Approximate Coil Weight: .42 lbs. (.19 kg.)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

VQ-S4M Direct Acting Spool, 4 Way 3 Position, Motor Center



DESCRIPTION

Low Profile 8 size, 3/4-16 thread, “Power” series, solenoid operated, 4W3P, motor center spool valve.

OPERATION

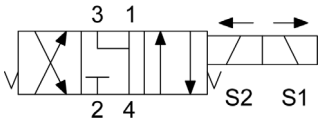
When de-energized the VQ-S4M allows flow between (1), (3) and (4), blocks flow at (2). When outer coil (S1) is energized the valve allows flow from (2) to (1) and from (3) to (4). When inner coil (S2) is energized the valve allows flow from (2) to (3) and from (1) to (4).

FEATURES

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.
- Optional “I” Coil: Weatherproof, Thermal Shock, Immersion Safe.

COMING SOON !

HYDRAULIC SYMBOL

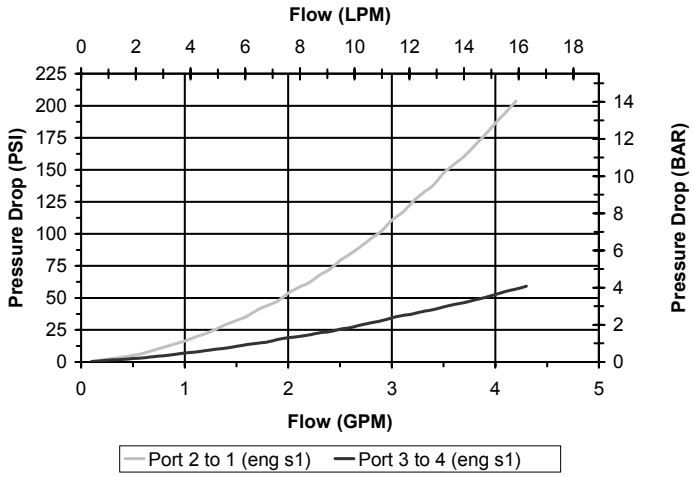


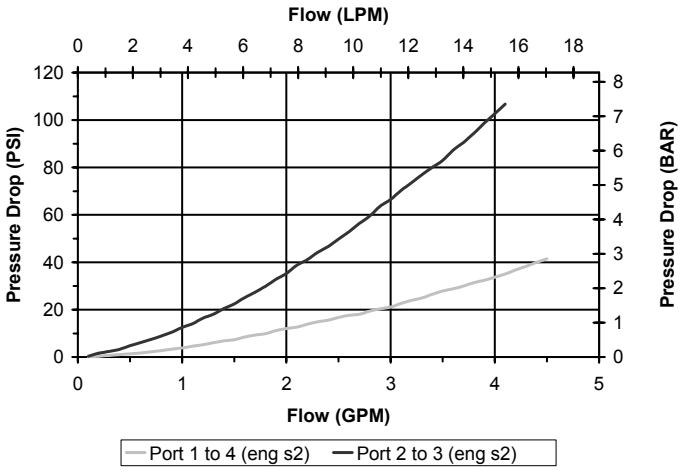
VALVE SPECIFICATIONS

Nominal Flow	3 GPM (11.3 LPM)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	10 cu in/min (163 ml/min) per path
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	-40° to 250° F (-40° to 120° C)
Weight	.42 lbs. (.19 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	25 ft-lbs (34 Nm)
Coil Nut Torque Requirements	4-6 ft-lbs (5.4-8.1 Nm)
Cavity	POWER 4W
Cavity Form Tool (Finishing)	40500029
Seal Kit	21191108

PERFORMANCE

Actual Test Data (Cartridge Only)


Flow (LPM)
0 2 4 6 8 10 12 14 16 18
225 200 175 150 125 100 75 50 25 0
Pressure Drop (PSI)
14 12 10 8 6 4 2 0
Pressure Drop (BAR)
0 1 2 3 4 5
Flow (GPM)
Port 2 to 1 (eng s1)
Port 3 to 4 (eng s1)


Flow (LPM)
0 2 4 6 8 10 12 14 16 18
120 100 80 60 40 20 0
Pressure Drop (PSI)
8 7 6 5 4 3 2 1 0
Pressure Drop (BAR)
0 1 2 3 4 5
Flow (GPM)
Port 1 to 4 (eng s2)
Port 2 to 3 (eng s2)

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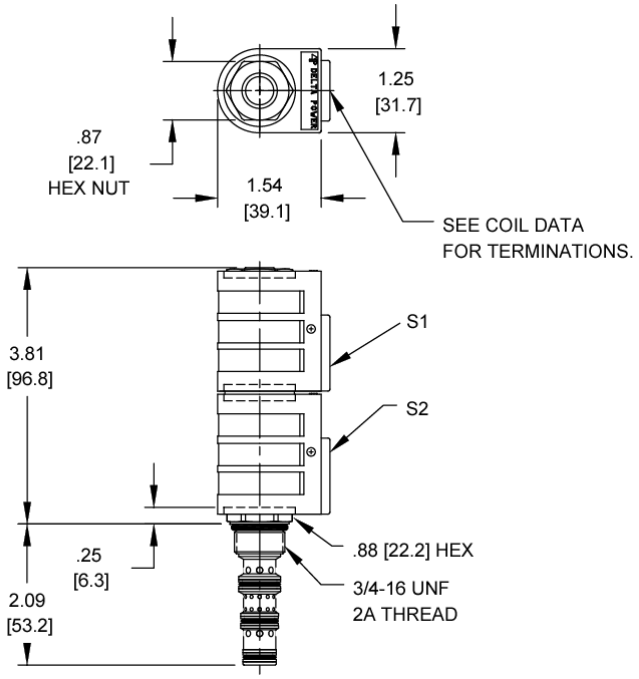
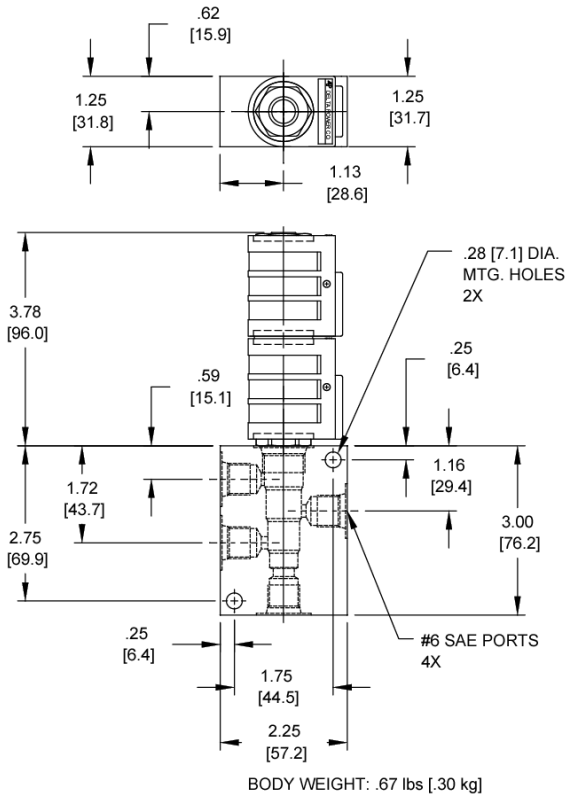
DIMENSIONS





BODY WEIGHT: .67 lbs [.30 kg]

ORDERING INFORMATION

VQ-S4M - ____ - ____ - ____ - ____

OPTIONS

Buna Standard	**00**
Viton Standard	**V0**

BODIES

Blank	Without Body
N	1/4 NPTF Ports
S	#6 SAE Ports

VOLTAGE

06	6 VDC
12	12 VDC
24	24 VDC
36	36 VDC
48	48 VDC
25	24 VAC
11	120 VAC
22	220 VAC
44	440 VAC

"P" COIL TERMINATION
(All DC Except as Noted)

DL	Double Lead
DT	Deutsch on Leads DT04-2P
ML	Metri-Pack on Leads
PL	Packard on Leads
WL	Weatherpack on Leads

SS	Single Spade
DS	Double Spade
HC	DIN 43650 (Hirschman) – *(AC & DC)*
CL	Conduit Lead – *(AC Only)*
DI	Deutsch – Integral DT04-2P

IMMERSION PROOF "P" TYPE

IA	"I" Coil AMP Superseal - Integral
ID	"I" Coil Deutsch – Integral DT04-2P
IJ	"I" Coil AMP Jr. Timer - Integral
IM	"I" Coil Metri-Pack – Integral

Approximate Coil Weight: .74 lbs. (.33 kg.)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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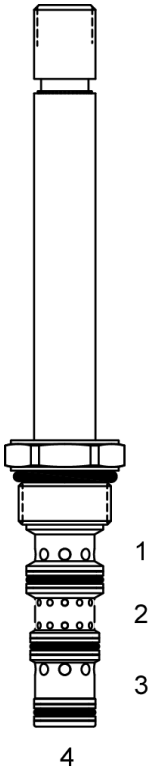
VQ-S4Q Direct Acting Spool, 4 Way 3 Position, Closed Center



DESCRIPTION

Low Profile 8 size, 3/4-16 thread, “Power” series, solenoid operated, 4W3P, closed center spool valve.

OPERATION

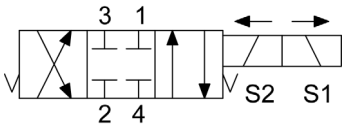
When de-energized the VQ-S4Q blocks flow to all ports. When outer coil (S1) is energized the valve allows flow from (2) to (1) and from (3) to (4). When inner coil (S2) is energized the valve allows flow from (2) to (3) and from (1) to (4).

FEATURES

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.
- Optional “I” Coil: Weatherproof, Thermal Shock, Immersion Safe.

COMING SOON !

HYDRAULIC SYMBOL

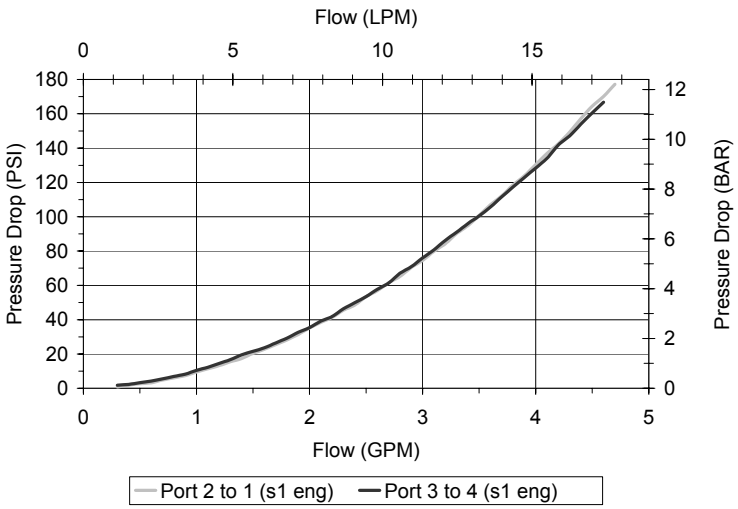


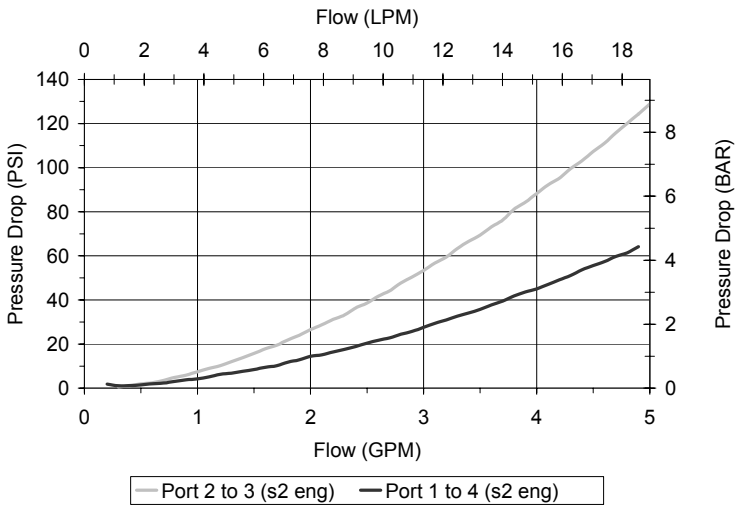
VALVE SPECIFICATIONS

Nominal Flow	3.5 GPM (13.2 LPM)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	10 cu in/min (163 ml/min) per path
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	-40° to 250° F (-40° to 120° C)
Weight	.42 lbs. (.19 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	25 ft-lbs (34 Nm)
Coil Nut Torque Requirements	4-6 ft-lbs (5.4-8.1 Nm)
Cavity	POWER 4W
Cavity Form Tool (Finishing)	40500029
Seal Kit	21191108

PERFORMANCE

Actual Test Data (Cartridge Only)


Flow (LPM)
0 5 10 15
180 160 140 120 100 80 60 40 20 0
Pressure Drop (PSI)
12 10 8 6 4 2 0
Pressure Drop (BAR)
0 1 2 3 4 5
Flow (GPM)
Port 2 to 1 (s1 eng)
Port 3 to 4 (s1 eng)


Flow (LPM)
0 2 4 6 8 10 12 14 16 18
140 120 100 80 60 40 20 0
Pressure Drop (PSI)
8 6 4 2 0
Pressure Drop (BAR)
0 1 2 3 4 5
Flow (GPM)
Port 2 to 3 (s2 eng)
Port 1 to 4 (s2 eng)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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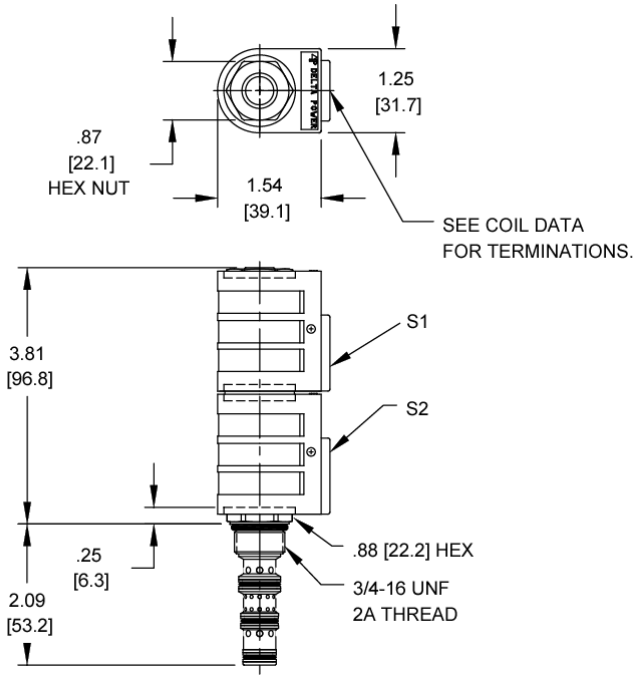
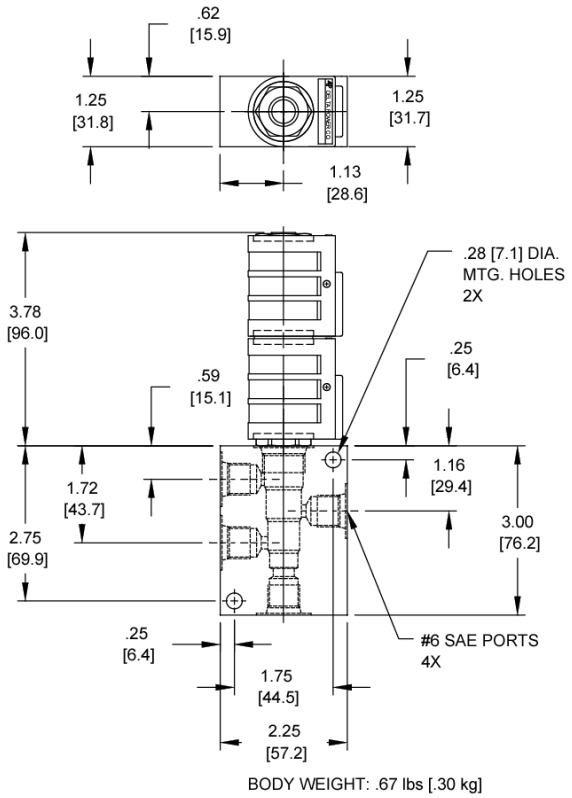
DIMENSIONS





BODY WEIGHT: .67 lbs [.30 kg]

ORDERING INFORMATION

VQ-S4Q - ____ - ____ ____ - ____

OPTIONS

Buna Standard	**00**
Viton Standard	**V0**

BODIES

Blank	Without Body
N	1/4 NPTF Ports
S	#6 SAE Ports

VOLTAGE

06	6 VDC
12	12 VDC
24	24 VDC
36	36 VDC
48	48 VDC
25	24 VAC
11	120 VAC
22	220 VAC
44	440 VAC

"P" COIL TERMINATION
(All DC Except as Noted)

DL	Double Lead
DT	Deutsch on Leads DT04-2P
ML	Metri-Pack on Leads
PL	Packard on Leads
WL	Weatherpack on Leads
SS	Single Spade
DS	Double Spade
HC	DIN 43650 (Hirschman) – *(AC & DC)*
CL	Conduit Lead – *(AC Only)*
DI	Deutsch – Integral DT04-2P

IMMERSION PROOF "P" TYPE

IA	"I" Coil AMP Superseal - Integral
ID	"I" Coil Deutsch – Integral DT04-2P
IJ	"I" Coil AMP Jr. Timer - Integral
IM	"I" Coil Metri-Pack – Integral

Approximate Coil Weight: .42 lbs. (.19 kg.)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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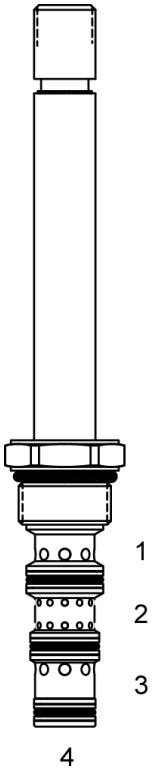
VQ-S4R Direct Acting Spool, 4 Way 3 Position, Tandem Center



DESCRIPTION

Low Profile 8 size, 3/4-16 thread, “Power” series, solenoid operated, 4W3P, tandem center spool valve

OPERATION

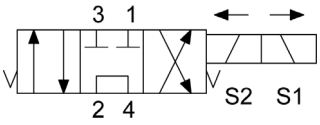
When de-energized the VQ-S4R allows flow between (2) and (4), ports (1) and (3) are blocked. When outer coil (S1) is energized the valve allows flow from (2) to (3) and from (1) to (4). When inner coil (S2) is energized the valve allows flow from (2) to (1) and from (3) to (4).

FEATURES

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override options.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.
- Optional “I” Coil: Weatherproof, Thermal Shock, Immersion Safe.

COMING SOON !

HYDRAULIC SYMBOL

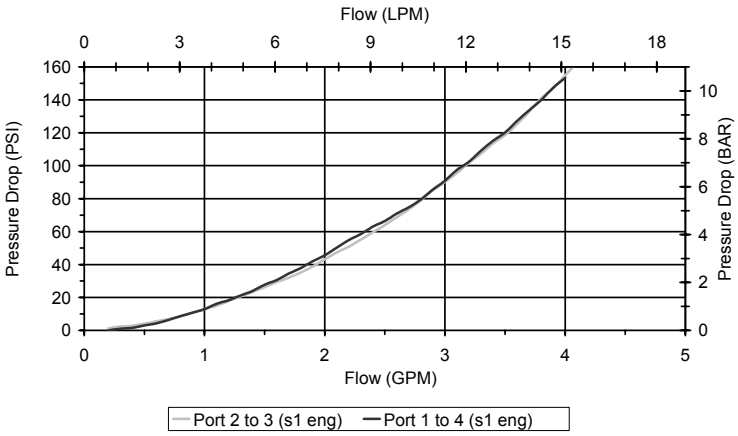


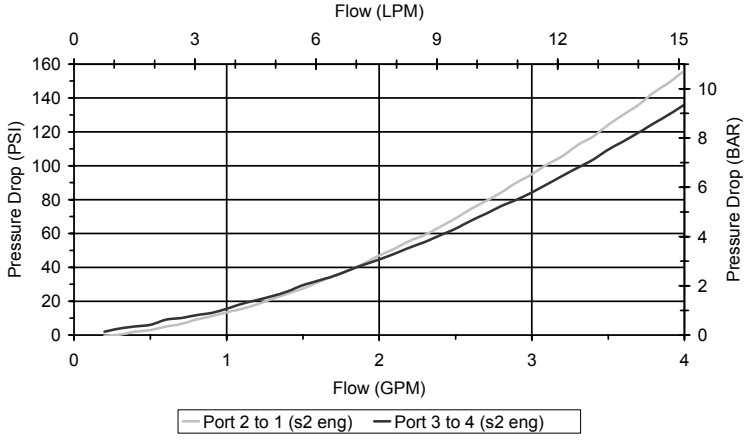
VALVE SPECIFICATIONS

Nominal Flow	2.5 GPM (9.5 LPM)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	15 cu in/min (245 ml/min) per path
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	-40° to 250° F (-40° to 120° C)
Weight	.42 lbs. (.19 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	25 ft-lbs (34 Nm)
Coil Nut Torque Requirements	4-6 ft-lbs (5.4-8.1 Nm)
Cavity	POWER 4W
Cavity Form Tool (Finishing)	40500029
Seal Kit	21191108

PERFORMANCE

Actual Test Data (Cartridge Only)


Flow (LPM)
0 3 6 9 12 15 18
160 140 120 100 80 60 40 20 0
Pressure Drop (PSI)
10 8 6 4 2 0
Pressure Drop (BAR)
0 1 2 3 4 5
Flow (GPM)
Port 2 to 3 (s1 eng)
Port 1 to 4 (s1 eng)


Flow (LPM)
0 3 6 9 12 15
160 140 120 100 80 60 40 20 0
Pressure Drop (PSI)
10 8 6 4 2 0
Pressure Drop (BAR)
0 1 2 3 4
Flow (GPM)
Port 2 to 1 (s2 eng)
Port 3 to 4 (s2 eng)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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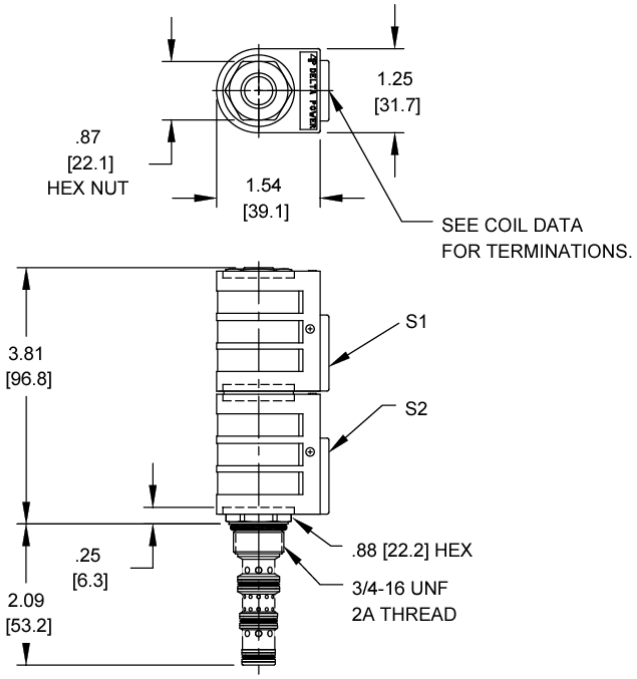
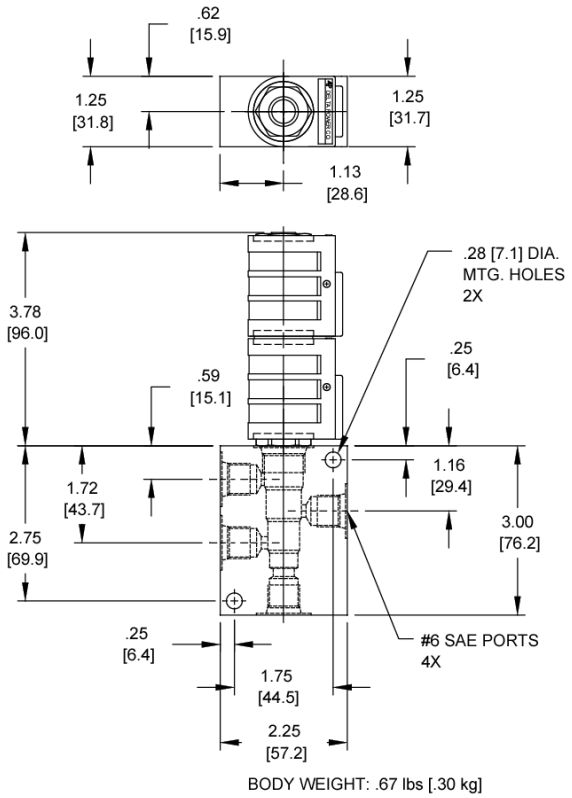
DIMENSIONS





BODY WEIGHT: .67 lbs [.30 kg]

ORDERING INFORMATION

VQ-S4R - ____ - ____ - ____ - ____

OPTIONS

Buna Standard	**00**
Viton Standard	**V0**

BODIES

Blank	Without Body
N	1/4 NPTF Ports
S	#6 SAE Ports

VOLTAGE

06	6 VDC
12	12 VDC
24	24 VDC
36	36 VDC
48	48 VDC
25	24 VAC
11	120 VAC
22	220 VAC
44	440 VAC

"P" COIL TERMINATION
(All DC Except as Noted)

DL	Double Lead
DT	Deutsch on Leads DT04-2P
ML	Metri-Pack on Leads
PL	Packard on Leads
WL	Weatherpack on Leads
SS	Single Spade
DS	Double Spade
HC	DIN 43650 (Hirschman) – *(AC & DC)*
CL	Conduit Lead – *(AC Only)*
DI	Deutsch – Integral DT04-2P

IMMERSION PROOF "P" TYPE

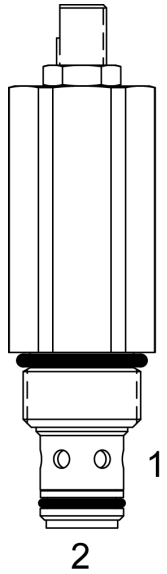
IA	"I" Coil AMP Superseal - Integral
ID	"I" Coil Deutsch – Integral DT04-2P
IJ	"I" Coil AMP Jr. Timer - Integral
IM	"I" Coil Metri-Pack – Integral

Approximate Coil Weight: .74 lbs. (.33 kg.)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

VE-RWA Direct Acting Relief Valve



DESCRIPTION

10 size, 7/8-14 thread, “Delta” series, direct acting relief valve

OPERATION

The VE-RWA blocks flow from (2) to (1) until sufficient pressure is present at (2) to force the poppet to open and allow metered flow from (2) to (1).

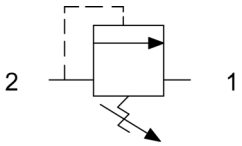
The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

FEATURES

- Hardened parts for long life.
- Industry common cavity.

COMING SOON !

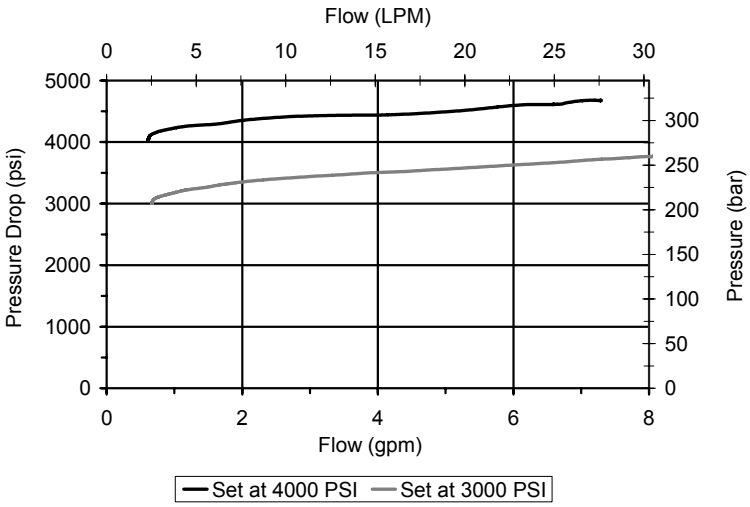
HYDRAULIC SYMBOL



For critical leakage applications consult factory.

PERFORMANCE

Actual Test Data (Cartridge Only)



VALVE SPECIFICATIONS

Nominal Flow	6 GPM (23 LPM)
Rated Operating Pressure	6500 PSI (448 bar)
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	-40° to 250° F (-40° to 120° C)
Weight	.51 lbs. (.23 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 2W
Cavity Form Tool (Finishing)	40500000
Seal Kit	21191200

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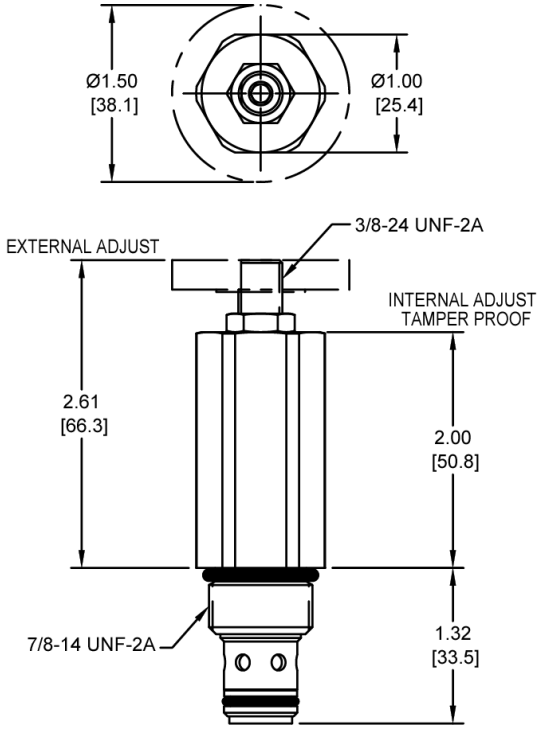
DIMENSIONS



ORDERING INFORMATION

UE-RWA - ____ - ____

OPTIONS	
External Adj. W/Locknut, Buna	**00**
External Adj. W/Locknut, Viton	**V0**
Buna, Knob	**0K**
Viton, Knob	**VK**
Internally Adj. Buna	**0I**
Internally Adj. Viton	**VI**
Tamper Proof, Buna	**0T**
Tamper Proof, Viton	**VT**

PRESSURE RANGE/SETTING

Ext./Int. Adjustment

6500 3000 – 6500 PSI

Tamper Proof

Fill In 4 Digit Pressure Setting

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Delta Power Company
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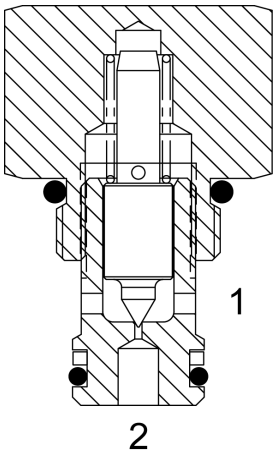
VA-RCT Direct Acting Thermal Relief Valve



DESCRIPTION

" Ultra High Pressure" 7 size, 5/8-18 Thread, "Mini" series, direct acting thermal relief valve.

OPERATION

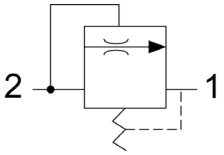
The VA-RCT blocks flow from (2) to (1) until sufficient pressure is present at (2) to force the poppet to open and allow flow from (2) to (1). (1) must be drained for proper function.

FEATURES

- Hardened parts for long life
- Industry common cavity

COMING SOON !

HYDRAULIC SYMBOL



Thermal relief valve is intended to prevent cylinder damage resulting from temperature induced pressure intensification. This valve is not intended for use as a dynamic relief valve or as protection against load-induced pressure spikes.

PERFORMANCE

Actual Test Data (Cartridge Only)

Rated for cyclical use to 0.1 GPM

VALVE SPECIFICATIONS

Nominal Flow	0.1 GPM (.38 LPM)
Rated Operating Pressure	6500 PSI (448 bar)
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	-40° to 250° F (-40° to 120° C)
Weight	.14 lbs. (.06 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	15 ft-lbs (20.3 Nm)
Cavity	MINI 2W
Cavity Form Tool (Finishing)	40500003
Seal Kit	21191000

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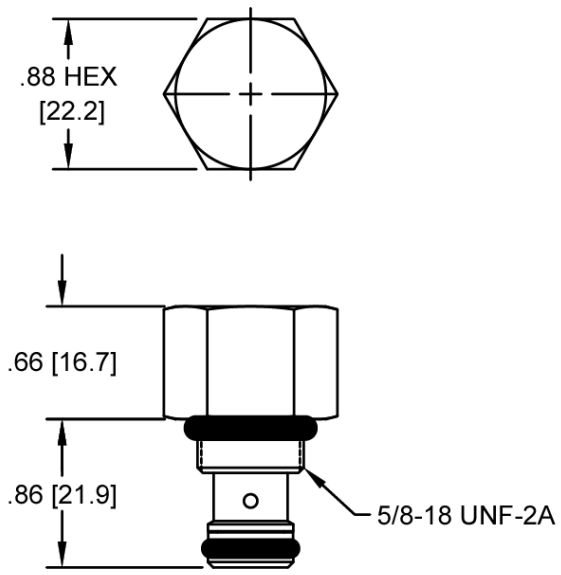
DIMENSIONS



ORDERING INFORMATION

VA-RCT - ____ - ____

OPTIONS

Buna Standard	**00**
Viton Standard	**V0**

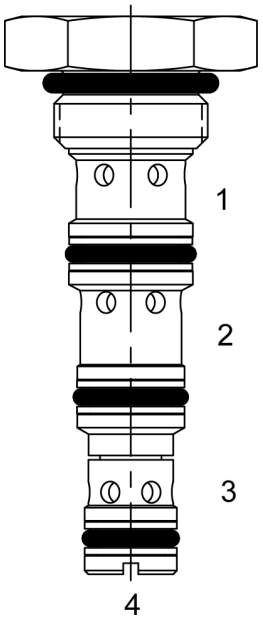
PRESSURE SETTING

4000	3000 - 4000 PSI
6500	4000 - 6500 PSI

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

MD-CDP Double Pilot Operated Check Valve



DESCRIPTION

7 size, 5/8 -14 thread, “Mini” series, double pilot operated check valve.

OPERATION

The MD-CDP allows flow to pass from (3) to (4) and (2) to (1). The valve blocks flow from (4) to (3) and from (1) to (2). Blocked flow is released when pilot pressure is applied to the port opposite of (3) and /or (2) respectively.

The valve has a 3:1 pilot ratio, so at least 1/3 of the load pressure at port (4) or (1) is required at the pilot line ports (ports (4) or (1) respectively) to open the flow passage to allow flow from port (4) or (1) respectively.

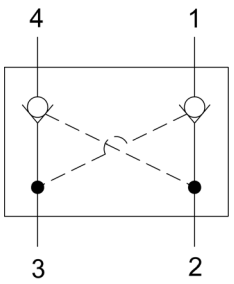
The check spring biased at 20 PSI (1.4 bar) to assure holding in the static or no-load conditions.

FEATURES

- Hardened parts for long life.
- Industry common cavity.

COMING SOON !

HYDRAULIC SYMBOL



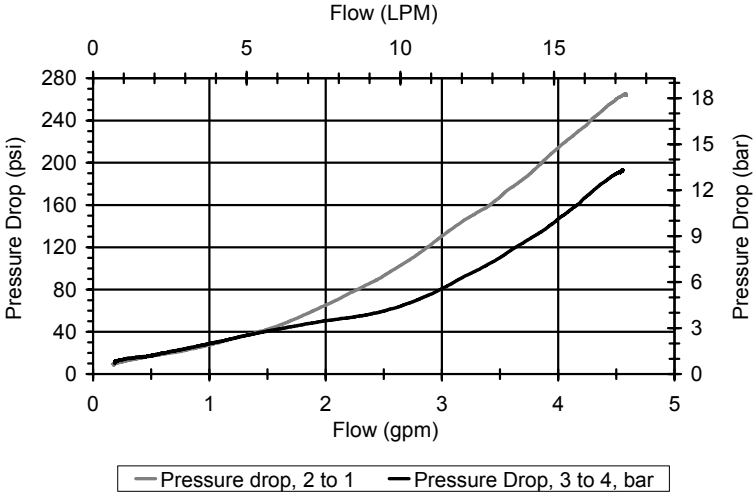
Great for “in Cylinder “ use Application

VALVE SPECIFICATIONS

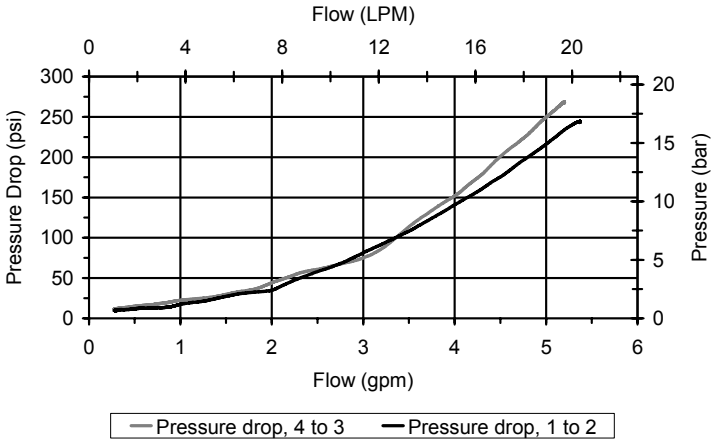
Nominal Flow	3 GPM (12 LPM)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	0 - 5 drop / min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	-40° to 250° F (-40° to 120° C)
Weight	.10 lbs. (.05 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	15 ft-lbs (20.3 Nm)
Cavity	MINI 4W
Cavity Form Tool (Finishing)	40500006
Seal Kit	21191008

PERFORMANCE

Actual Test Data (Cartridge Only)



MD-CDP-00, Pressure Drop - Piloted



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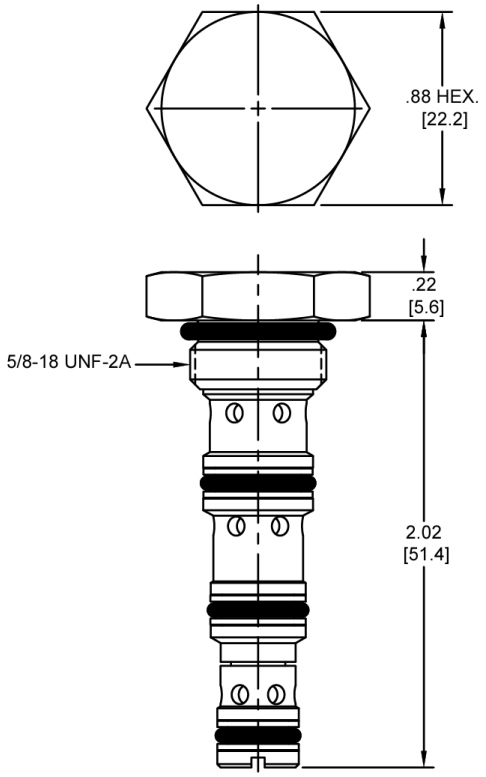
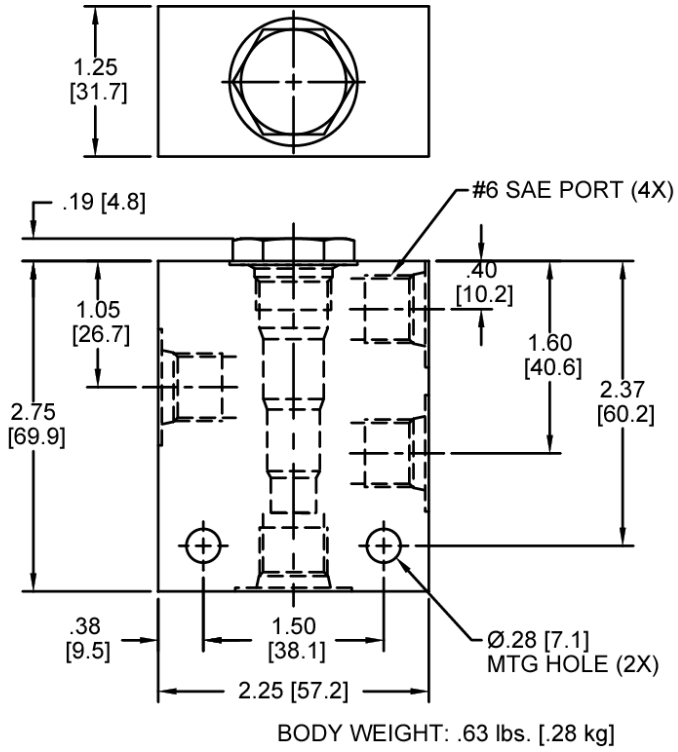
DIMENSIONS





BODY WEIGHT: .63 lbs. [.28 kg]

ORDERING INFORMATION

MD-CDP - ____ - ____ - ____

OPTIONS

Buna Standard	**00**
Viton Standard	**V0**

SPRING BIAS

0020 20 PSI

BODIES

Blank	Without Body
N	1/4" NPTF PORT
S	#6 SAE Ports

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Delta Power Company
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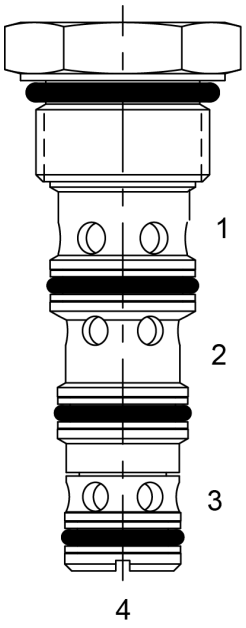
PQ-CDP Double Pilot Operated Check Valve



DESCRIPTION

8 size, 3/4 -16 thread, “Power” series, double pilot operated check valve.

OPERATION

The PQ-CDP allows flow to pass from (3) to (4) and (2) to (1). The valve blocks flow from (4) to (3) and from (1) to (2). Blocked flow is released when pilot pressure is applied to the port opposite of (3) and /or (2) respectively.

The valve has a 3:1 pilot ratio, so at least 1/3 of the load pressure at port (4) or (1) is required at the pilot line ports (ports (4) or (1) respectively) to open the flow passage to allow flow from port (4) or (1) respectively.

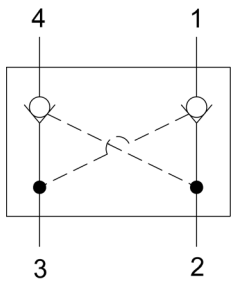
The check spring biased at 20 PSI (1.4 bar) to assure holding in the static or no-load conditions.

FEATURES

- Hardened parts for long life.
- Industry common cavity.

COMING SOON !

HYDRAULIC SYMBOL



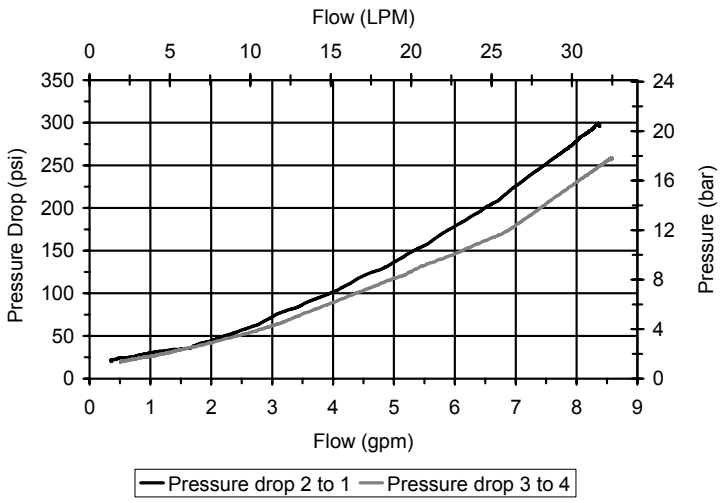
Great for “in Cylinder “ use Application

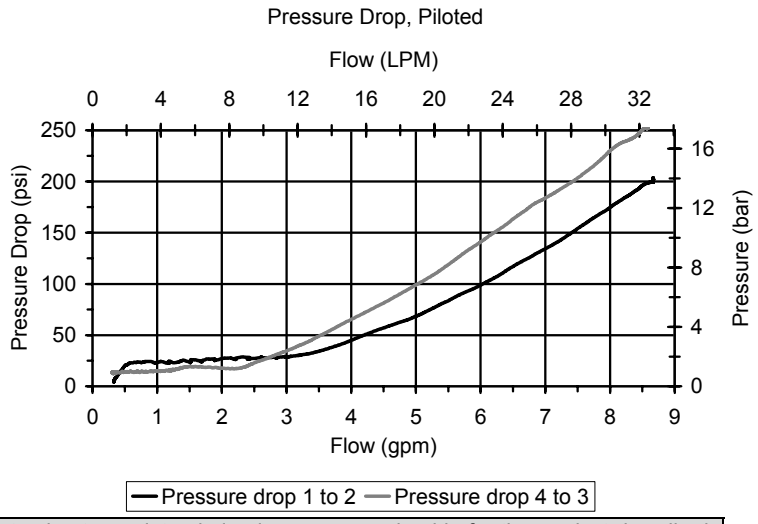
VALVE SPECIFICATIONS

Nominal Flow	5 GPM (19 LPM)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	0 - 5 drop / min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	-40° to 250° F (-40° to 120° C)
Weight	.12 lbs. (.05 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	25 ft-lbs (34 Nm)
Cavity	POWER 4W
Cavity Form Tool (Finishing)	40500029
Seal Kit	21191108

PERFORMANCE

Actual Test Data (Cartridge Only)


Flow (LPM)
0 5 10 15 20 25 30
350 300 250 200 150 100 50 0
Pressure Drop (psi)
24 20 16 12 8 4 0
Pressure (bar)
0 1 2 3 4 5 6 7 8 9
Flow (gpm)
Pressure drop 2 to 1
Pressure drop 3 to 4


Pressure Drop, Piloted
Flow (LPM)
0 4 8 12 16 20 24 28 32
250 200 150 100 50 0
Pressure Drop (psi)
16 12 8 4 0
Pressure (bar)
0 1 2 3 4 5 6 7 8 9
Flow (gpm)
Pressure drop 1 to 2
Pressure drop 4 to 3

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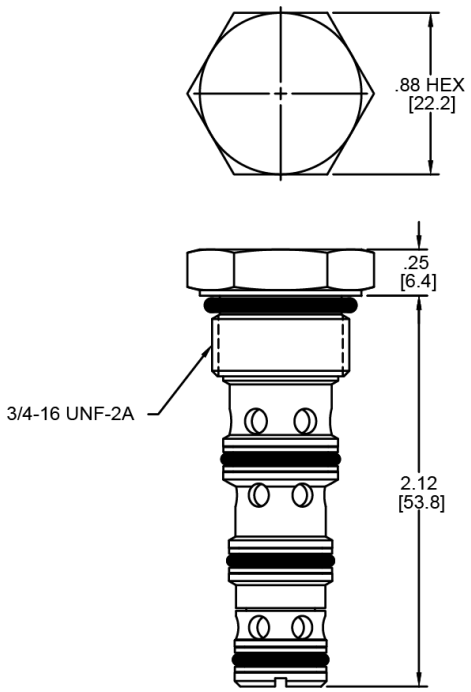
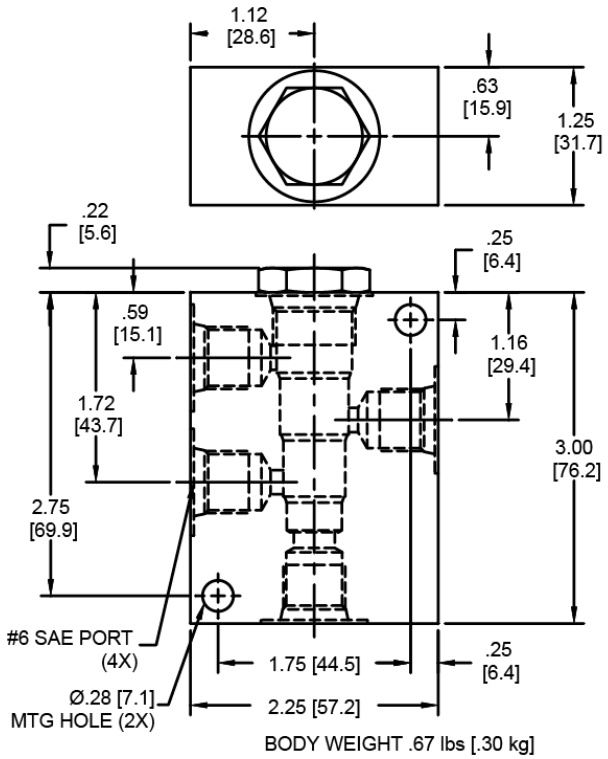
DIMENSIONS





BODY WEIGHT .67 lbs [.30 kg]

ORDERING INFORMATION

PQ-CDP - ____ - ____ - ____

OPTIONS

Buna Standard	**00**
Viton Standard	**V0**

SPRING BIAS

0020	20 PSI

BODIES

Blank	Without Body
N	1/4" NPTF PORT
S	#6 SAE Ports

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Delta Power Company
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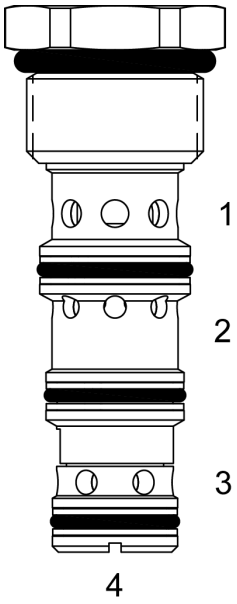
DG-CDP Double Pilot Operated Check Valve



DESCRIPTION

10 size, 7/8 -14 thread, “Delta” series, double pilot operated check valve.

OPERATION

The DG-CDP allows flow to pass from (3) to (4) and (2) to (1). The valve blocks flow from (4) to (3) and from (1) to (2). Blocked flow is released when pilot pressure is applied to the port opposite of (3) and /or (2) respectively.

The valve has a 3:1 pilot ratio, so at least 1/3 of the load pressure at port (4) or (1) is required at the pilot line ports (ports (4) or (1) respectively) to open the flow passage to allow flow from port (4) or (1) respectively.

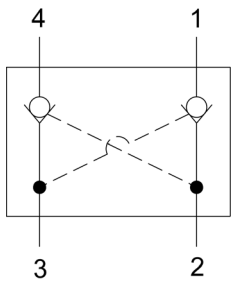
The check spring biased at 20 PSI (1.4 bar) to assure holding in the static or no-load conditions.

FEATURES

- Hardened parts for long life.
- Industry common cavity.

COMING SOON !

HYDRAULIC SYMBOL



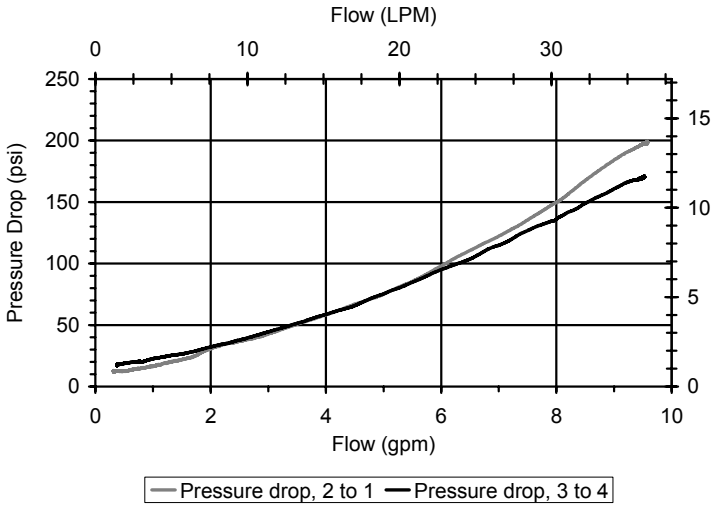
Great for “in Cylinder “ use Application

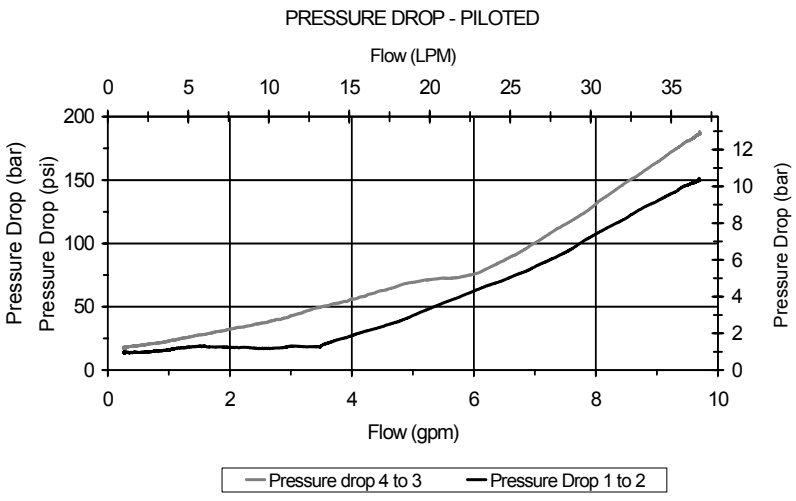
VALVE SPECIFICATIONS

Nominal Flow	8 GPM (30 LPM)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	0 - 5 drop / min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	-40° to 250° F (-40° to 120° C)
Weight	.20 lbs. (.09 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 4W
Cavity Form Tool (Finishing)	40500002
Seal Kit	21191214

PERFORMANCE

Actual Test Data (Cartridge Only)





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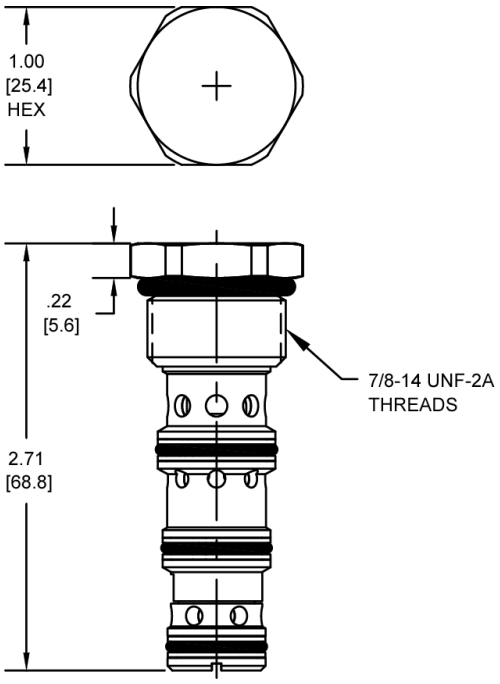
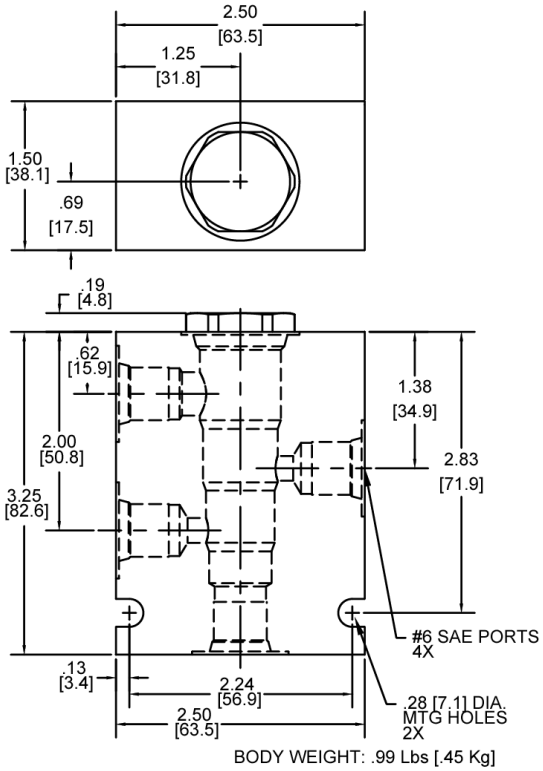
DIMENSIONS





BODY WEIGHT: .99 Lbs [.45 Kg]

ORDERING INFORMATION

DG-CDP - ____ - ____ - ____

OPTIONS

Buna Standard	**00**
Viton Standard	**V0**

SPRING BIAS

0020 20 PSI

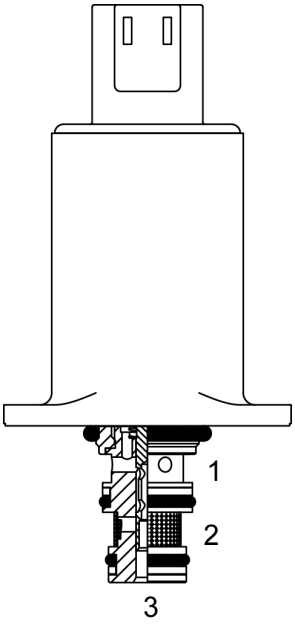
BODIES

Blank	Without Body
N	1/4" NPTF PORT
S	#6 SAE Ports

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

IP-DAR-43-DT12-H Direct Acting Proportional, Pressure Reducing/Relieving, Flange Retained



DESCRIPTION

Special series, flange retained, slip in proportional pressure reducing/relieving valve.

OPERATION

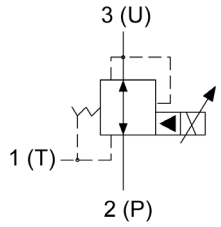
When de-energized the IP-DAR-43-DT12-H allows flow to pass bi-directionally from (2) to (3), with the spring chamber constantly drained at (1).

Increasing current applied to the coil will increase control "*reducing*" pressure. On attainment of proportionally determined pressure at (3), the cartridge shifts to block flow at (2), thereby regulating pressure at (3). In this mode, the valve also will relieve (3) to (1) at a variable value over the set reducing pressure.

FEATURES

- Efficient wet-armature construction.
- Unitized.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations available (Consult Factory).

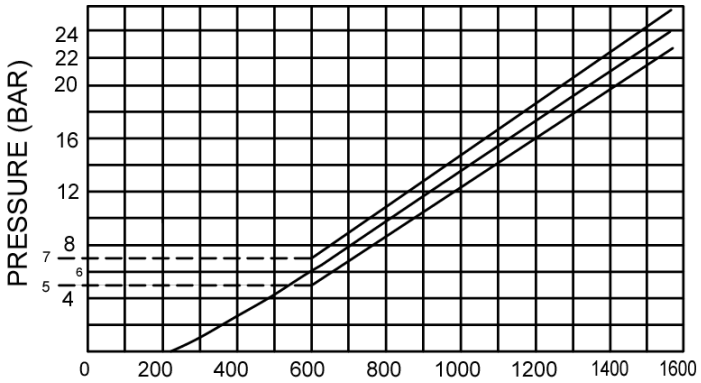
HYDRAULIC SYMBOL



COMING SOON !

Consult Factory for Valve retention options.
Flanged Retained Product.

PERFORMANCE



VALVE SPECIFICATIONS

Nominal Flow	1 GPM (4 LPM)
Max Operating Pressure	5000 PSI (350 bar)
Leakage at Rest	.9 cu in/min (15 ml/min) at 500 PSI (35 bar)
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	-35° to 200° F (-37.2° to 93.3° C)
Weight	.63 lbs. (.29 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cavity	Special
Seal Kit	Special

COIL SPECIFICATIONS

Current Supply Characteristics	PWM
Rated Current Range	150 – 1500 mA
PWM or Super-imposed Dither Frequency	100 - 150 Hz
Coil Resistance	5.4 ohms +/- 5% at 68°F (20°C)
Coil Termination	Deutsch (DT04-2P)
Connector Color	Black

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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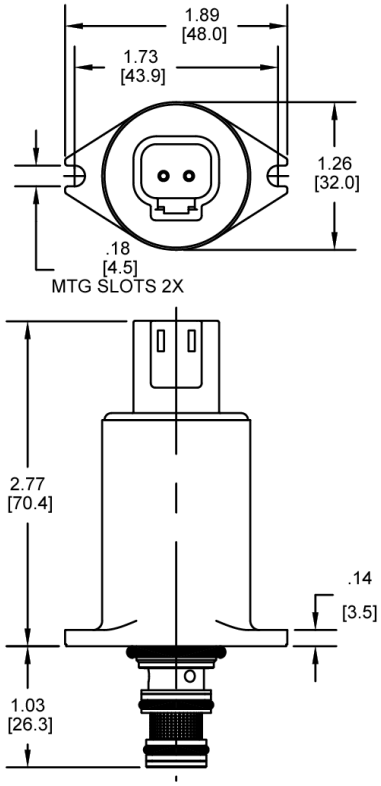
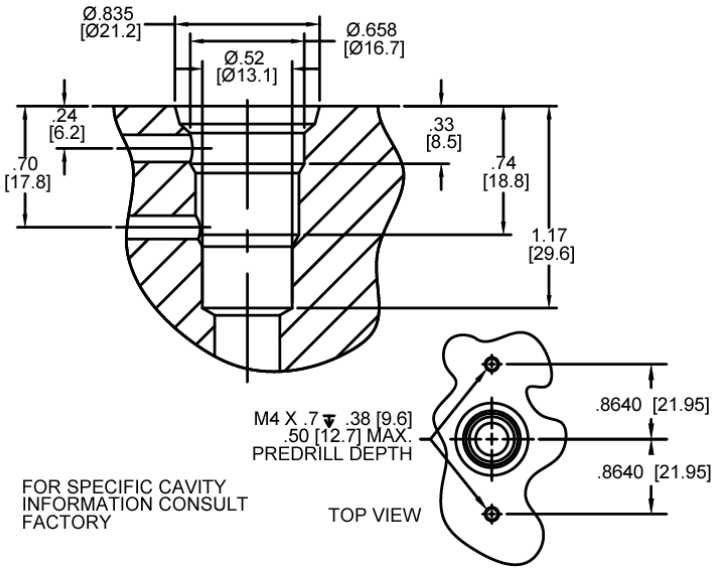
DIMENSIONS





ORDERING INFORMATION

IP-DAR-43-DT12-H

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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Manual Override Options

Rotary Type Manual Override Option

Standard rotary override option for normally open valves.

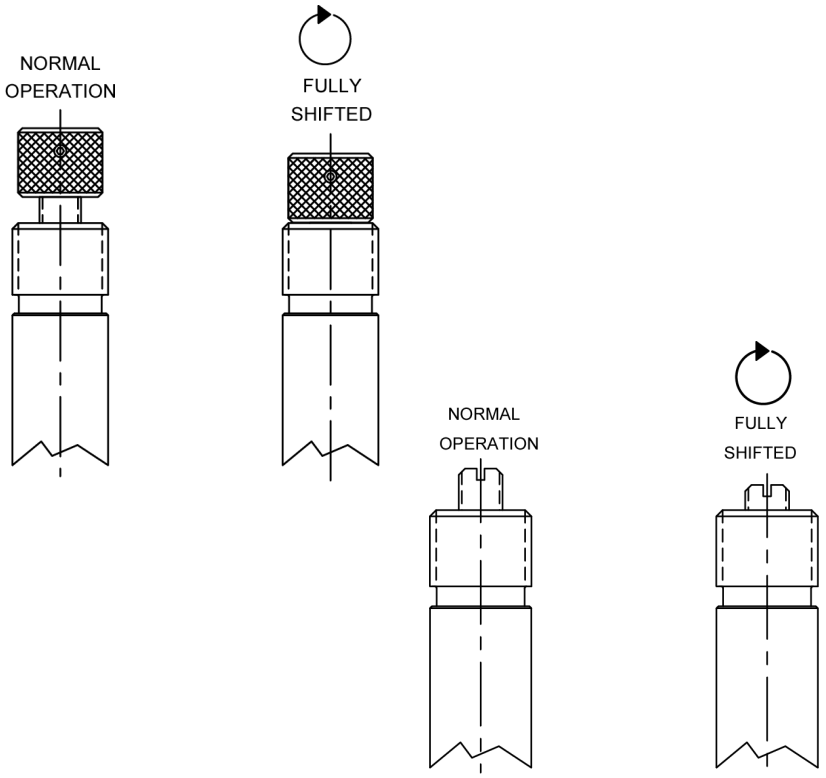
This override option is offered with or without a knob.

To activate override option, fully rotate using a flat tip screwdriver or the knob in a clockwise direction.

To de-activate override, fully rotate using a flat tip screwdriver or the knob in a counter clockwise direction.

Note: Not rotating override fully in either direction will result in partial shifting of valve.

WARNING: Over torque of manual override could result in valve damage.



Rotary Type Manual Override Option Bi-Directional

COMING SOON !

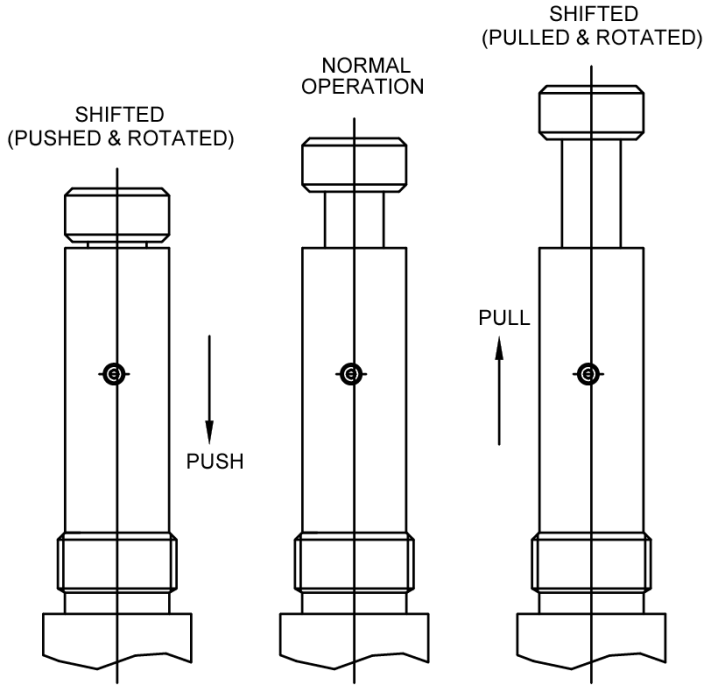
Standard Bi-directional override option used for 4W3P valves.

This override is offered with or without the detent option.

With detent option, first rotate knob 90 degrees clockwise to unlock knob from center detent position. Next, pull or push knob and rotate 90 degrees counterclockwise to detent.

To return to the normal operating position, rotate knob 90 degrees clockwise and release. Rotate the knob 90 degrees counterclockwise to lock knob back into center detent position.

Without the detent option the knob must be pulled or pushed, and then held to maintain override position.



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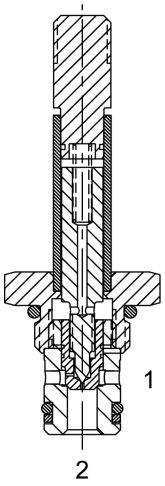
MA-S2F Pilot Operated Poppet, 2 Way, Normally Closed – Micro Leakage



DESCRIPTION

7 size, 5/8-18 thread, "Mini" series, solenoid operated, 2 way normally closed, pilot operated soft seat poppet valve with reverse flow de-energized.

OPERATION

When de-energized the MA-S2F blocks flow from (1) to (2) and allows free reverse flow from (2) to (1). When energized the valve allows flow from (1) to (2) and restricts flow from (2) to (1).

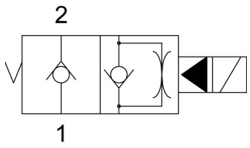
FEATURES

- Soft seat for ultra low leakage.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

COMING SOON !

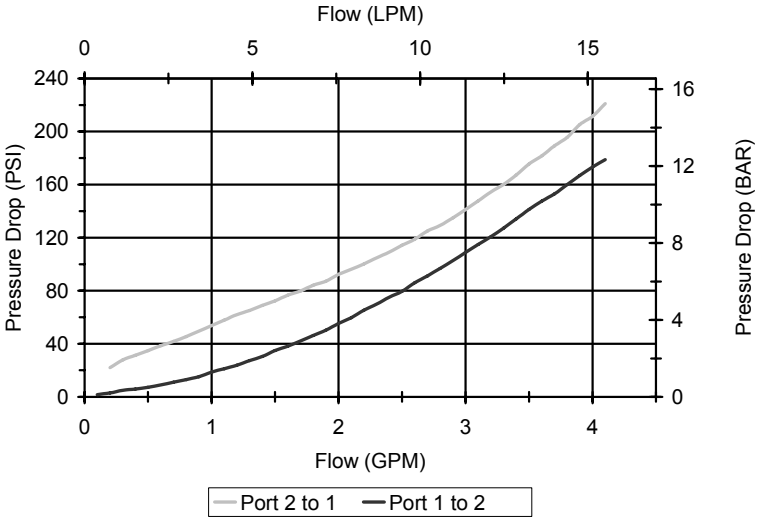
Operational shift limit 2.5 GPM (9.5 LPM). For shifted flow performance consult chart.

HYDRAULIC SYMBOL



PERFORMANCE

Actual Test Data (Cartridge Only)



VALVE SPECIFICATIONS

Maximum Flow	2.5 GPM (9.5 LPM)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	"Ultra Low", 2 Drops / Hour
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	-20° to 170° F (-28° to 77° C)
Weight	.12 lbs. (.05 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	15 ft-lbs (20.3 Nm)
Coil Nut Torque Requirements	3-5 ft-lbs (4.1-6.8 Nm)
Cavity	MINI 2W
Cavity Form Tool (Finishing)	40500003
Seal Kit	21191000

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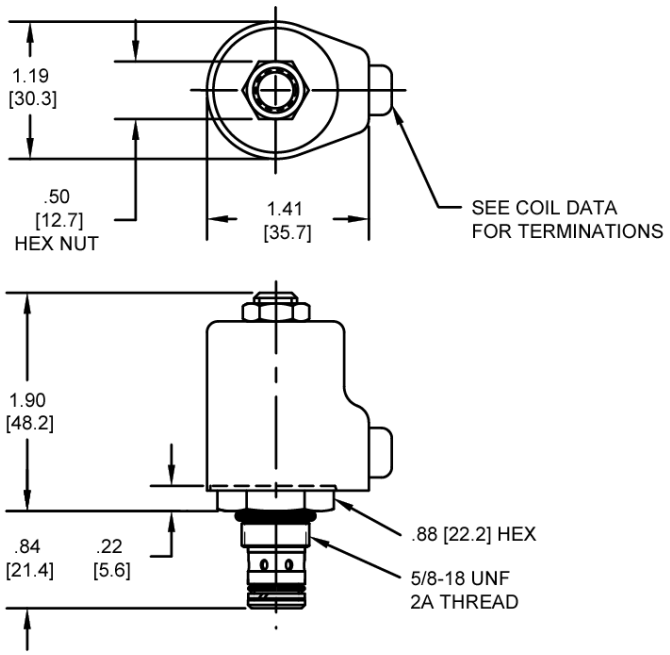
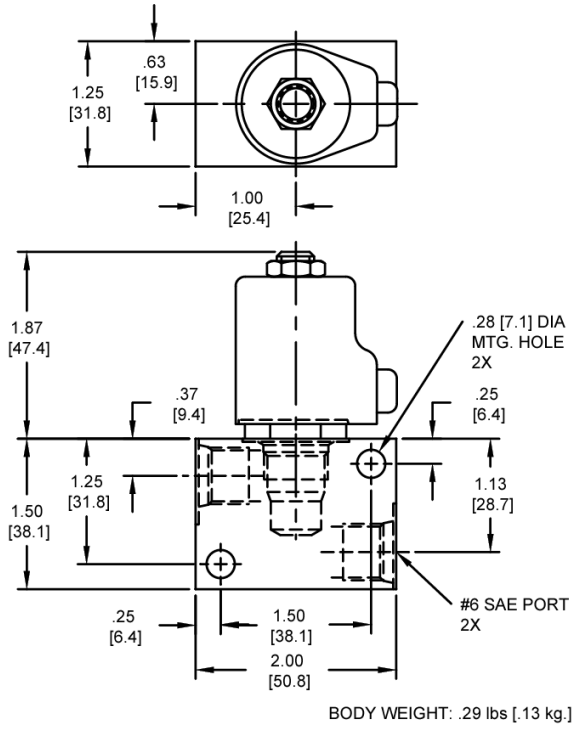
DIMENSIONS





BODY WEIGHT: .29 lbs [.13 kg.]

ORDERING INFORMATION

MA-S2F - ___ - ___ ___ - ___

OPTIONS

Buna Standard	**00**
Viton Standard	**V0**
Buna & Screen	**A0**
Viton & Screen	**W0**

Note: Use screen only if flow direction is from (1) to (2).

"M" COIL TERMINATION
(All DC Except as Noted)

Double Lead	**DL**
Deutsch on Leads DT04-2P	**DT**
Metri-Pack on Leads	**ML**
Packard on Leads	**PL**
Weatherpack on Leads	**WL**
Single Spade	**SS**
Double Spade	**DS**
DIN 43650 (Hirschman) – *(AC&DC)*	**HC**
Conduit Lead – (AC Only)	**CL**

BODIES

Blank	Without Body
N	1/4 NPTF Ports
S	#6 SAE Ports

VOLTAGE

06	6 VDC
12	12 VDC
24	24 VDC
36	36 VDC
48	48 VDC
25	24 VAC
11	120 VAC
22	220 VAC
44	440 VAC

Approximate Coil Weight: .30 lbs. (.14 kg.)

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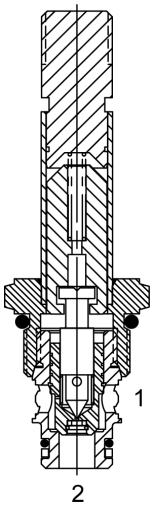
PB-S2F Pilot Operated Poppet, 2 Way Normally Closed – Soft Seat



DESCRIPTION

8 size, 3/4-16 thread, "Power" series, solenoid operated, 2 way normally closed, pilot operated soft seat poppet valve with reverse flow de-energized.

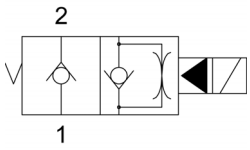
OPERATION

When de-energized the PB-S2F blocks flow from (1) to (2) and allows reverse flow from (2) to (1). When energized the valve allows flow from (1) to (2) and restrict flow from (2) to (1).
OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES

- Soft seat for ultra low leakage.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.
- Optional "I" Coil: Weatherproof, Thermal Shock, Immersion Safe.

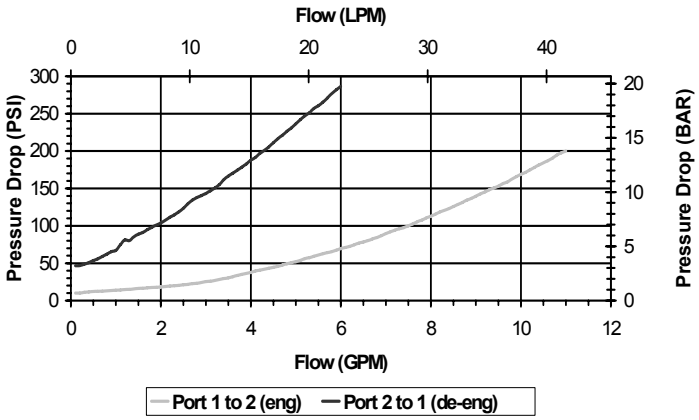
HYDRAULIC SYMBOL



Operational shift limit is 6 GPM.
For shifted performance consult chart.

PERFORMANCE

Actual Test Data (Cartridge Only)



VALVE SPECIFICATIONS

Maximum Flow	6 GPM (23 LPM)
Rated Operating Pressure	2500 PSI (172 bar)
Typical Internal Leakage (150 SSU)	Negligible
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	-35° to 200° F (-37° to 93° C)
Weight	.19 lbs. (.08 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	25 ft-lbs (34 Nm)
Coil Nut Torque Requirements	4-6 ft-lbs (5.4-8.1 Nm)
Cavity	POWER 2W
Cavity Form Tool (Finishing)	40500005
Seal Kit	21191100

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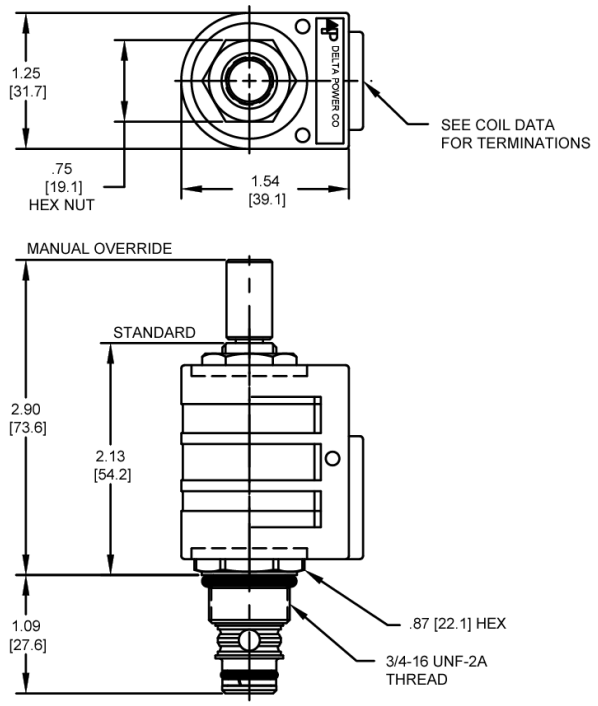
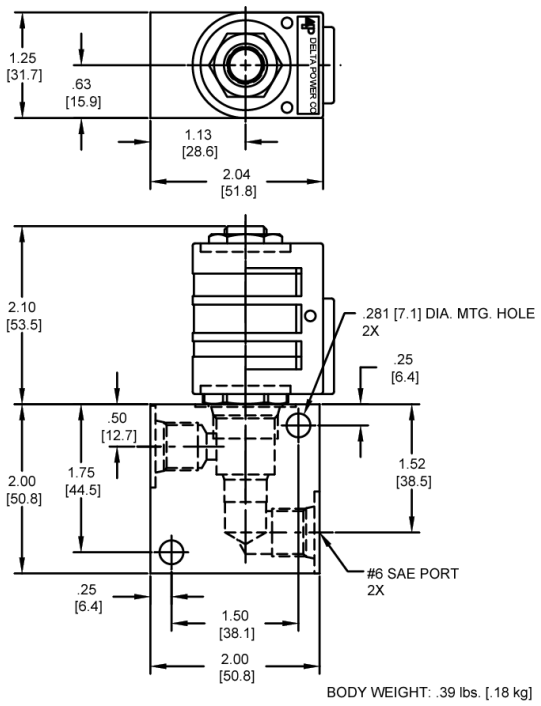
DIMENSIONS





ORDERING INFORMATION

PB-S2F - ____ - ____ ____ - ____

OPTIONS	
Buna Standard	**00**
Viton Standard	**V0**
Buna, Override, Detent	**0M**
Viton, Override, Detent	**VM**
Buna, Screen	**A0**
Viton, Screen	**W0**
Buna, Override, Nondetent	**B1**
Viton. Override, Nondetent	**V1**
Buna, Screen, Override, Nondetent	**B3**
Viton, Screen, Override, Nondetent	**V3**
Buna, Screen, Override, Detent	**B4**
Viton, Screen, Override, Detent	**V4**

Note: Use screen only if flow direction is from (1) to (2).

BODIES	
Blank	Without Body
N	1/4 NPTF Ports
S	#6 SAE Ports

VOLTAGE	
06	6 VDC
12	12 VDC
24	24 VDC
36	36 VDC
48	48 VDC
25	24 VAC
11	120 VAC
22	220 VAC
44	440 VAC

"P" COIL TERMINATION
(All DC Except as Noted)

DL	Double Lead
DT	Deutsch on Leads DT04-2P
ML	Metri-Pack on Leads
PL	Packard on Leads
WL	Weatherpack on Leads
SS	Single Spade
DS	Double Spade
HC	DIN 43650 (Hirschmann) – *(AC & DC)*
CL	Conduit Lead – *(AC Only)*
DI	Deutsch – Integral DT04-2P

IMMERSION PROOF "P" TYPE

IA	"I" Coil AMP Superseal - Integral
ID	"I" Coil Deutsch - Integral DT04-2P
IJ	"I" Coil AMP Jr. Timer - Integral
IM	"I" Coil Metri-Pack - Integral

Approximate Coil Weight: .42 lbs/.19 kg.

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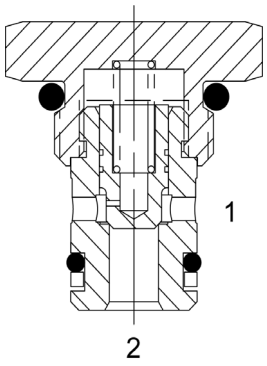
MA-CVS Direct Acting Check Valve, Soft Seat, Poppet



DESCRIPTION

7 size, 5/8-18 Thread, “Mini” series, direct acting check valve, soft seat, poppet.

OPERATION

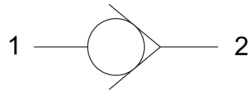
The MA-CVS allows free flow (2) to (1) and blocks flow from (1) to (2).

The cartridge has a fully guided poppet, which is spring-biased closed, until sufficient pressure is applied at (2) to open (1).

FEATURES

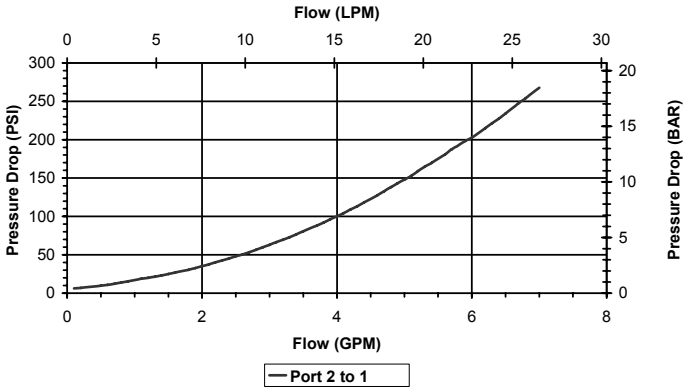
- Soft seat for ultra low leakage.
- Industry common cavity.
- Optional bias springs for backpressure application flexibility.
- Fully guided poppet.

HYDRAULIC SYMBOL



PERFORMANCE

Actual Test Data (Cartridge Only)



VALVE SPECIFICATIONS

Nominal Flow	2.5 GPM (9.5 LPM)
Rated Operating Pressure	1500 PSI (103 bar)
Typical Internal Leakage (150 SSU)	Negligible
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	32° to 160° F (0° to 70° C)
Weight	.08 lbs. (.03 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	15 ft-lbs (20.3 Nm)
Cavity	MINI 2W
Cavity Form Tool (Finishing)	40500003
Seal Kit	21191000

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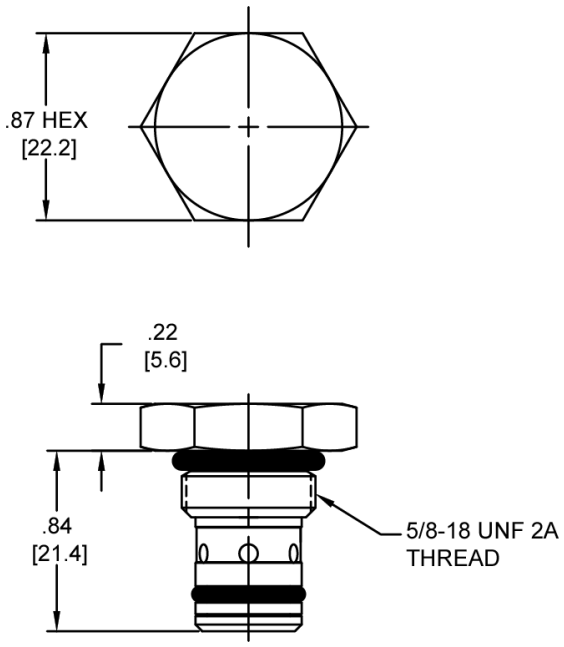
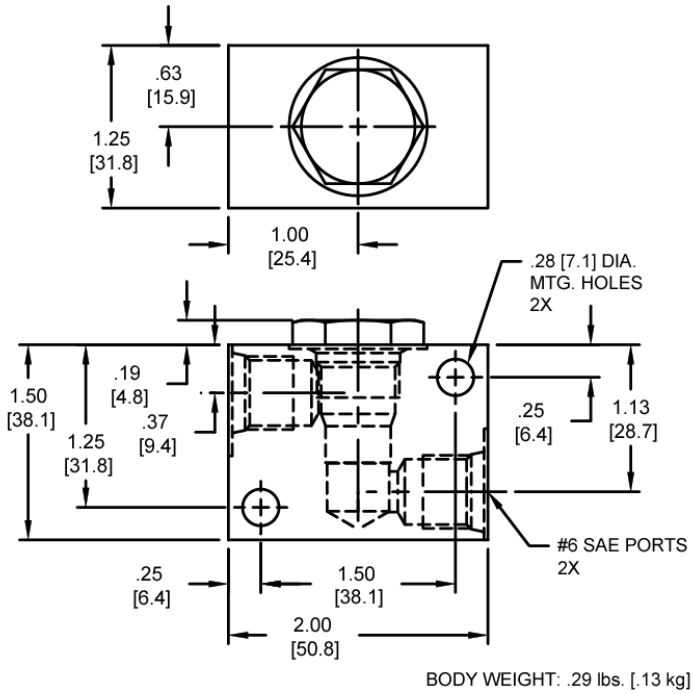
DIMENSIONS





BODY WEIGHT: .29 lbs. [.13 kg]

ORDERING INFORMATION

MA-CVS - ____ - ____ - ____

OPTIONS		CRACK PRESSURE		BODIES	
Buna Standard	**00**	**0005**	5 PSI	Blank	Without Body
Viton Standard	**V0**	**0020**	20 PSI	**N**	1/4 NPTF Ports
			±10%	**S**	#6 SAE Ports

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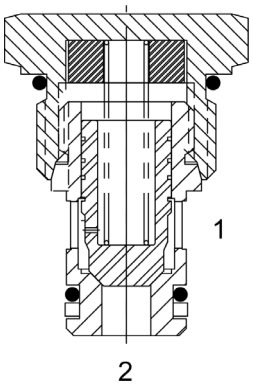
PB-CVS Direct Acting Check Valve, Soft Seat, Poppet



DESCRIPTION

8 size, 3/4-16 thread, “Power” series, direct acting check valve, soft seat, poppet.

OPERATION

The PB-CVS allows free flow passage from (2) to (1), and blocks flow from (1) to (2).

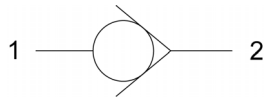
The cartridge has a fully guided poppet, which is spring-biased closed, until sufficient pressure is applied at (2) to open to (1).

.

FEATURES

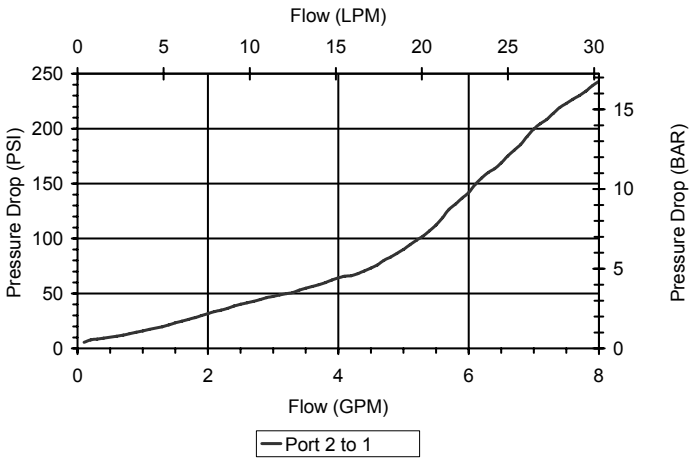
- Soft seat for ultra low leakage.
- Optional bias springs for backpressure application flexibility.
- Fully guided poppet assembly.
- Industry common cavity.

HYDRAULIC SYMBOL



PERFORMANCE

Actual Test Data (Cartridge Only)



VALVE SPECIFICATIONS

Nominal Flow	5 GPM (19 LPM)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	Negligible
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temperature Range	-35° to 200° F (-37° to 93° C)
Weight	.09 lbs. (.04 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	POWER 2W
Cavity Form Tool (Finishing)	40500005
Seal Kit	21191100

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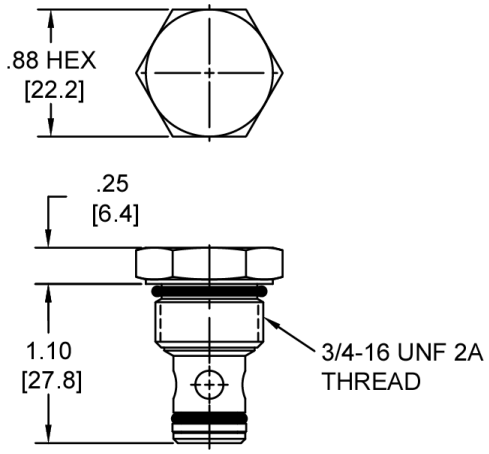
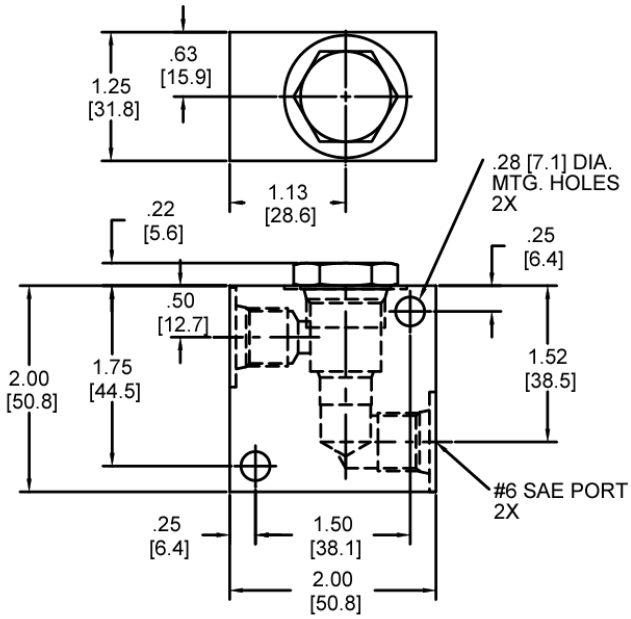
DIMENSIONS





BODY WEIGHT: .39 lbs. [.18 kg.]

ORDERING INFORMATION

PB-CVS - ____ - ____ - ____

OPTIONS	
Buna Standard	**00**
Viton Standard	**V0**

BODIES	
Blank	Without Body
N	1/4 NPTF Ports
S	#6 SAE Ports

CRACK PRESSURE	
0005	5 PSI
0020	20 PSI
0030	30 PSI
0050	50 PSI
	± 10%

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Catalog Updates

Replacement Pages	Mnemonic	Change
2	DE-S2I	Changed DE-S2I flow rating to 3 GPM on the Quick Selection Guide
38-39	PB-S2I	Added Higher Pressure or Higher Flow Option Note to Light Bulb Section
40-41	DE-S2I	Added Higher Pressure or Higher Flow Option Note to Light Bulb Section
88-89	PB-S2H	Corrected Operation to When energized the valve blocks flow from (1) to (2) and (2) to (1).
166-167	HV-S4E	HV-S4A should be HV-S4E wrong page was inserted on the paper copy only
194-195	PQ-S4Q	Under Order Information, change "D" Coil Termination to "P" Coil Termination
204-205	DE-CVA	Changed Seal Kit number from 21191000 to 21191200
206-207	HE-CVA	Changed Seal Kit number from 21191000 to 21191200
216-217	DE-CVC	Changed Torques to 30ft-lbs
226-227	DE-CVS	Added Caution note that pilot piston is not recommended
232-233	DF-CPB	Added Caution note that pilot piston is not recommended
248-249	PB-MCA	Added Spring Bias note to Light Bulb Section too.
250-251	DE-MCA	Added Spring Bias note to Light Bulb Section too.
252-253	DE-MCF	Added Spring Bias note to Light Bulb Section too.
254-255	DE-MCS	Added Spring Bias note to Light Bulb Section too.
256-257	DE-MCB	Added Spring Bias note to Light Bulb Section too.
258-259	PB-MCI	Changed PBMCIOK to OL and PBMCIVK to VL under Options
260-261	PB-MCL	Added Spring Bias note to Light Bulb Section too.
262-263	DE-MCL	Added Spring Bias note to Light Bulb Section too.
266-267	HB-MCP	Changed Leakage to 5 drops/min
282-283	SO-PTS	Changed Cavity Form Tool from 40500038 to 40500020
284-285	SO-PTT	Changed Cavity Form Tool from 40500038 to 40500020
294-295	SJ-MRA	Corrected operational description
299	Relief Vlv. Index	Corrected port designation on hydraulic symbols
304-305	PB-RVA	Changed 0800 Spring Option range to 100 to 800 PSI
314-315	PB-RVD	Changed 0800 Spring Option range to 100 to 800 PSI
326-327	HT-RVP	Increased Rated Operating Pressure to 5000 PSI
344-345	TR-PCA	Changed Cavity from Tecnord 3W to 3WS and form tool from 40500034 to 40500033
376-377	DF-PWE	Corrected Mnemonic under Operation from DF-PWI to DF-PWE
392-393	DE-FCH	Under Ordering Information, added FINE and STRD adjusting options
402-403	SJ-NVA	Corrected Dimensional view on back page
416-417	HT-FCA	Changed to flow increases from low to high with counter-clockwise rotation.
442-443	SN-FDA	Changed Nominal Flow from 30 GPM to 40 GPM
446-447	DG-FDH	Corrected Light Bulb note to DG-FDH and DG-FDA
456-457	EE-P2B	Added Installation, Purging, Frequency and Bleed Screw Note
458-459	EE-P2C	Added Installation, Purging, Frequency and Bleed Screw Note
460-461	EE-PRB	Added Installation, Purging, Frequency and Bleed Screw Note
462-463	ET-PRB	Added Installation, Purging, Frequency and Bleed Screw Note

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Catalog Updates

Replacement Pages	Mnemonic	Change
464-465	EE-PRD	Added Installation, Purging, Frequency and Bleed Screw Note, Also corrected drawing to show Power Coil and added Pressure Regulation curve
510-511	F Mizer	Changed max pressure to 1500 PSI, removed 30 pressure option
522-523	L Mizer	Changed Cartridges size to Special Series M20 X 1.5-H6 Thread
532-533	Q Mizer	Changed Pressure Rating from 4500 PSI to 3500 PSI
550-551	IM-CVF-11	Changed Pressure Rating from 3000 PSI to 3500 PSI
568-569	HP-HPB	Changed Valve Specification to 3000 PSI and added 24 inch handle not supplied
572-573	HP-HPD	Changed Valve Specification to 3000 PSI and added 24 inch handle not supplied
576-577	QS-MRS	Removed spring from Hydraulic Symbol and added all ports closed in transition note to light bulb section